

Commercial Standard

CS20-56

SUPERSEDES CS20-49

Vitreous China Plumbing Fixtures

A RECORDED VOLUNTARY STANDARD OF THE TRADE

COMMODITY STANDARDS

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UNITED STATES DEPARTMENT OF COMMERCE

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Prepared by

OFFICE OF TECHNICAL SERVICES

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In cooperation with

NATIONAL BUREAU OF STANDARDS

Vitreous China Plumbing Fixtures

(Sixth Edition)

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1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish a basic specification for vitreous china plumbing fixtures for the guidance of manufacturers, distributors, and purchasers; to promote better understanding between suppliers and users; and to serve as a basis for fair competition in furnishing vitreous china plumbing fixtures to meet the principal demands of the trade.

2. SCOPE

2.1 This Commercial Standard establishes standard nomenclature, definitions, and method of grading for vitreous china plumbing fixtures, and includes requirements for material, construction, testing, and marking and labeling. Standard dimensions and certain general practices are given herein for vitreous china water-closet bowls, tanks, lavatories, urinals, and sinks classed as staple items. Sizes and types of vitreous china plumbing fixtures not specifically mentioned herein are not classed as staple items.

3. COLOR

3.1 In addition to white, vitreous china plumbing fixtures are made several attractive colors. The shade or tint of each color is determined by the individual manufacturer.

4. GENERAL REQUIREMENTS

4.1 *Material*.—The plumbing fixtures shall be of vitreous china, and shall meet the absorption and crazing tests given herein. (See paragraphs 7.1 to 7.4.)

4.2 *Thickness*.—Vitreous china shall be not less than $\frac{1}{4}$ inch thick at any point.

4.3 *Glazed surfaces*.—The glaze shall be thoroughly fused to the fixture body. All exposed surfaces shall be glazed, except those coming in contact with walls or floors, and except as follows: On lavatories set away from walls, those portions of the rear aprons used for supporting the fixtures in kilns, and also the back of overflows and underside of outlet boss, may be without glaze; the inside and underside of water-closet tanks and the underside of lids need not be glazed. Other fixtures may have unglazed portions at points where supported in the kilns, but such unglazed surfaces shall be located so as not to be visible when the fixture is installed in the normal manner. Inside of trapways of water-closet bowls shall be glazed.

4.4 *Grading*.—Vitreous china plumbing fixtures shall be graded in accordance with the method given herein. (See paragraphs 6.1 to 6.6.) The terms "first quality" and "seconds"¹ shall be used to designate the grades thus determined. "First quality" fixtures shall be in full conformity with this standard, and be free from blemishes and defects to the extent specified in tables 1, 2, and 3, as applicable.

4.4.1 Careful inspection is employed in each department of manufacture, and each of the imperfections listed herein as acceptable under the "first quality" grading is caused by some unavoidable condition in the manufacturing process. The blemishes permitted in grading do not affect the utility value of the fixture or make it unsafe from a health or sanitary point of view.

4.5 *Dimensional tolerances*.—Variations from dimensions specified herein shall be not more than 5 percent, plus or minus, except where maximum or minimum limits are specified.

4.6 *Trap seal*.—The depth of seal for integral traps in all vitreous china fixtures shall be not less than 2 inches, except where greater minimum depths are specified.

4.7 *Illustrations*.—The illustrations shown herein for various fixtures are for convenience in locating dimensions, and are not intended to indicate designs.

4.7.1 Underlined dimensions in the illustrations are identical for all sizes and types of similar items.

5. DETAIL REQUIREMENTS

5.1 Staple Water-Closet Bowls.

5.1.1 *Flushing*.—Water-closet bowls covered by this standard shall pass the flushing test specified in paragraph 7.5, so as to be considered as having a satisfactory flushing action.

5.1.2 *Spud size*.—The standard sizes for spuds on all water-closet bowls shall be as follows: 2 inches for all water-closet bowls operated under low tanks; $1\frac{1}{2}$ inches for all water-closet bowls operated under high tanks or flush valves.

¹ The designation "seconds" replaces the word "culls" as used in earlier editions of this standard.

5.1.3 *Outlets.*—The outlets of water-closet bowls shall conform to the dimensions shown in figure 1.

5.1.4 *"Juvenile" water-closet bowls* shall be 13 inches minimum, 13½ inches maximum from floor to top of rim, and shall have the same top contour as regular bowls. (Smaller or "baby" bowls are considered special).

5.1.5 *Combinations.*—The following water-closet combinations shall be considered staple:

(a) Close-coupled water-closet combination: Water-closet bowl with separate tank secured to and supported by the water-closet bowl.

(b) Flush valve water-closet combination: Water-closet bowl with flush valve.

(c) Integral water-closet combination: Single piece of china comprising water-closet bowl and tank.

5.1.6 *Designation of combinations.*—Water-closet combinations shall be designated as above, with the type of water-closet bowl inserted, as, for example, "flush-valve siphon-jet water-closet combination," or "flush-valve reverse-trap water-closet combination."

5.1.7 *Top contour for water-closet bowls.*—Regular and elongated water-closet bowls shall have top contours as shown, respectively, in figure 2.

5.1.8 *Washdown water-closet bowl.*—The term "washdown" shall be applied to a water-closet bowl having back supply (except for use as part of integral or close-coupled combinations), integral flushing rim and jet, a minimum water surface of 8 by 7 inches, a minimum water seal of 2½ inches, and a siphon trapway at the front of closet which shall pass a 1½-inch-diameter solid ball. See figures 3 and 4.

5.1.9 *Reverse-trap water-closet bowl.*—The term "reverse trap" shall be applied to a water-closet bowl having back supply (except for use as part of integral or close-coupled combinations), integral flushing rim and jet, a minimum water surface of 9 by 8 inches, a minimum water seal of 2½ inches, and a siphon trapway at the rear of closet which shall pass a 1½-inch-diameter solid ball. See figures 5, 6, and 7.

5.1.10 *Siphon-jet water-closet bowl.*—The term "siphon jet" shall be applied to a water-closet bowl having top supply (except for use as part of a close-coupled combination), integral flushing rim and jet, a minimum water surface of 12 by 10 inches, a minimum depth of seal of 3 inches, and a siphon trapway at the rear of bowl which shall pass a 2⅝-inch-diameter solid ball. See figures 8 and 9.

5.1.11 *Blowout wall-hanging water-closet bowl for flush valve.*—The term "blowout wall hanging" shall be applied to a wall closet bowl having top or back supply, integral flushing rim and jet, a minimum water surface of 12 by 10 inches, a minimum depth of seal of 3 inches, and a trapway which shall pass a 2⅝-inch-diameter solid ball. See figures 10 and 11.

5.1.12 *Siphon-jet wall-hanging water-closet bowl for flush valve.*—The term "siphon jet wall hanging" shall be applied to a wall closet bowl having top or back supply, integral flushing rim and jet, a minimum water surface of 12 by 10 inches, a minimum depth of seal of 3 inches, and a siphon trapway which shall pass a 2⅝-inch-diameter solid ball. See figure 12.

5.1.13 *Bolt holes for wall-hanging water-closet bowls.*—The vertical spacing between bolt-hole centers on siphon-jet wall-hanging water-

closet bowls shall be 7½ inches. The vertical spacing between bolt-hole centers on blowout wall-hanging water-closet bowls shall be 6¼ inches. The diameters of all bolt holes used for mounting wall-hanging water-closet bowls shall be ⅝ inch minimum, with elongation of upper bolt holes to accommodate old mountings at the option of each manufacturer.

5.2 Staple Tanks.

5.2.1 Staple low wall-hanging tank shall be as shown in figure 13.

5.2.2 The following shall be furnished with "trimmed" staple low wall-hanging tank:

- One elevated float valve (ball cock) with refill tube and float ball rod.

- One float.

- One tank flush valve with overflow.

- One single-acting operating lever with handle set horizontally.

- One 2-inch-outside-diameter elbow flush connection 5 by 6 inches maximum, complete with nuts and rubber washers.

- Two wood screws with washers or hooks for tank.

The following item is optional according to the understanding between buyer and seller:

- One 2-inch spud escutcheon where required. (Supply pipe and supply pipe escutcheon are listed as separate fittings, not trim.)

5.2.3 High tanks for urinals shall have automatic flush valves. The following sizes are staple:

- No. 1—to flush approximately 1½ gallons.

- No. 3—to flush approximately 3 gallons.

- No. 4—to flush approximately 4½ gallons.

5.3 Staple Lavatories.

5.3.1 Lavatory shall be of one-piece vitreous china with oval, rectangular, or D-shaped bowl, apron, and front antisplash rim. Lavatory shall have integral overflow at front or back with cross-sectional area not less than 1½ square inches at every point. Overflow point of slab shall be not more than ½ inch above slab surface at lowest point of faucet bearings. The location of holes for faucets, spouts, drains, etc., shall be as shown in figures 14 to 18.

5.3.2 *Faucet-hole spacing for exposed center-set fittings mounted horizontally.*—The standard faucet-hole spacing is 4 inches center to center, in top of or in front of the shelf or the ledge in either shelf-back or ledge-back lavatories; and in lavatories with or without back.

5.3.3 *Faucet-hole spacing for separate faucets and combination fittings.*—The standard faucet-hole spacing is 8 inches center to center, except where commercial practice requires other spacing. Faucet holes shall be in top of slab for all staple lavatories with or without back. For ledge-type and shelf-back-type lavatories the openings for combination fittings may be either in top of ledge or shelf, in front wall of shelf back, or in an inclined panel in front of shelf.

5.4 Staple Urinals.

5.4.1 Stall urinal shall be of one-piece vitreous china with straight or slope front and integral flushing rim, as shown in figure 19. There

are two standard sizes of plain-seam covers for stall urinals—one for urinals installed on 21-inch centers, and one for those on 24-inch centers. It is recommended that winged seam covers be eliminated.

5.4.2 Pedestal urinal shall be of vitreous china with integral flush rim, siphon jet, top inlet, and pedestal base with siphon trap, all molded in the ware. The depth of the water seal shall be not less than 2 inches, and the siphon trapway shall pass a solid ball not less than 1½ inches in diameter. See figure 20.

5.4.3 Wall-hanging washout urinal shall be of vitreous china and of washout type, with integral flushing rim, trap, and extended shields all molded in the ware. Fixture may have integral cast strainer or open trapway. The water seal shall be not less than 2 inches. Urinal shall be as shown in figure 21.

5.4.4 *Wall-hanging washout urinal with bottom outlet.*—Fixture shall be of wall-hanging washout type, of vitreous china, with top inlet, integral strainer, and bottom outlet, and with either a flushing rim or a flush spreader. See figure 22.

5.4.5 *Wall-hanging blowout urinal.*—Fixture shall be of wall-hanging blowout type, of vitreous china, with integral flushing rim and trap all molded in the ware. Water seal of trap shall be not less than 2 inches. See figure 23.

5.4.6 *Wall-hanging siphon-jet urinal.*—Fixture shall be of wall-hanging siphon-jet type, of vitreous china, with integral flushing rim, top inlet, and siphon trap all molded in the ware. Water seal of trap shall be not less than 2 inches. See figure 24.

5.5 Staple Service Sinks.

5.5.1 Vitreous china service sink shall be of one-piece vitreous china with integral back and with space behind back for supplies. The service sink shall be as shown in figure 25.

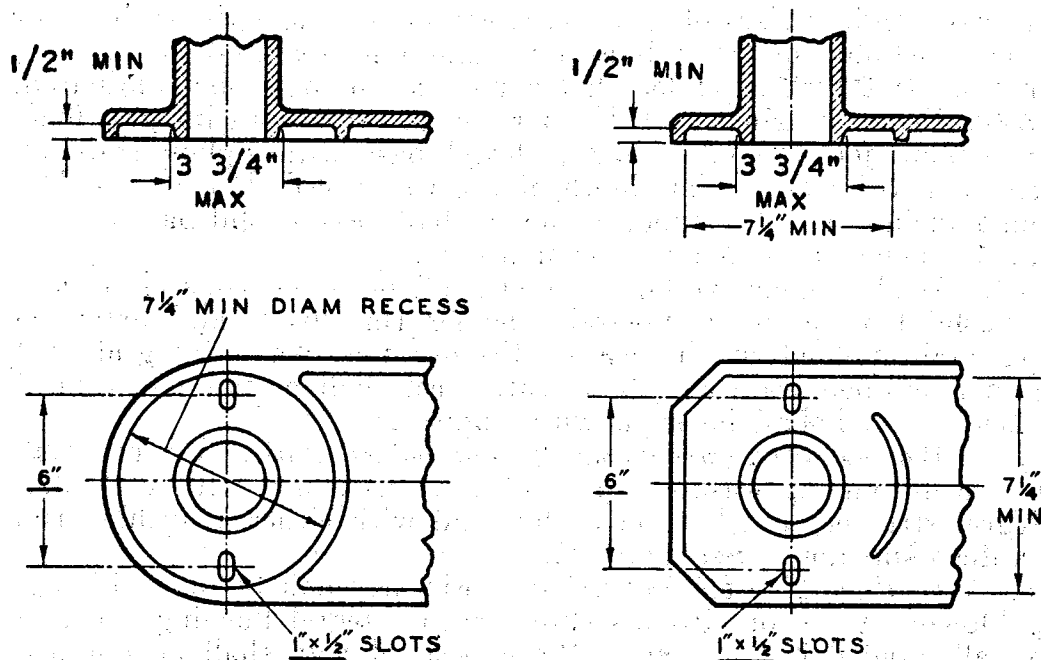
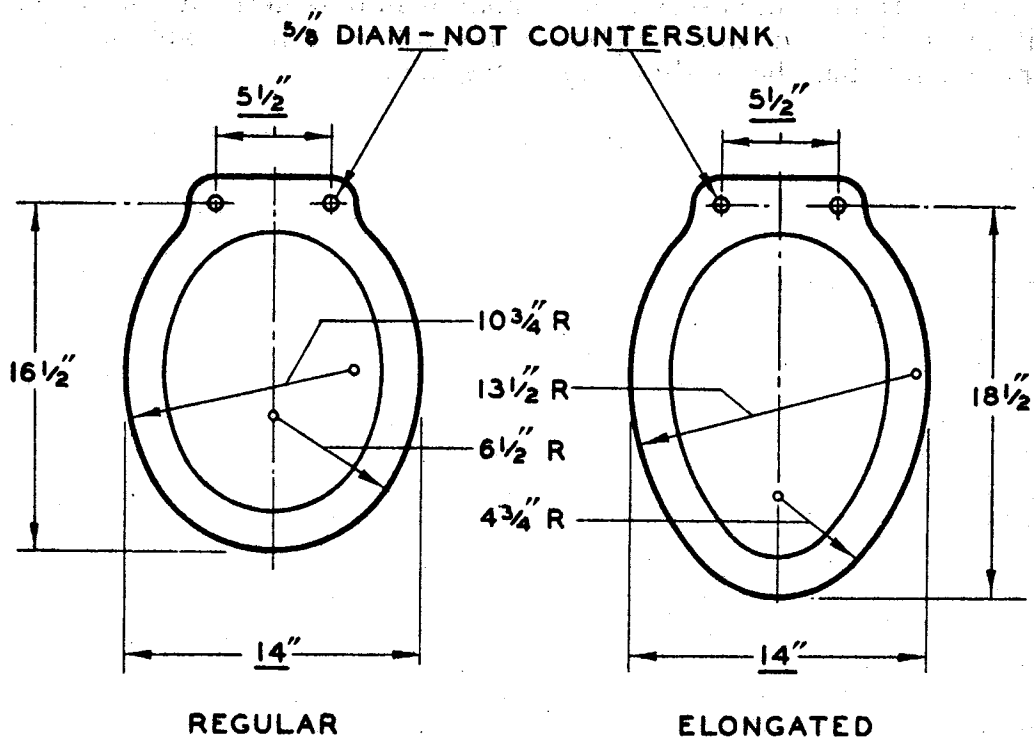


FIGURE 1. Outlet of water-closet bowl and pedestal urinal.

Note 1. Designs of bases may vary from those shown.

Note 2. Underlined dimensions in all illustrations are identical for all sizes and types of similar items.



REGULAR

ELONGATED

FIGURE 2. Top contour for water-closet bowls.

ALLOW SPACE FOR 1" WASHER
UNDER LEDGE

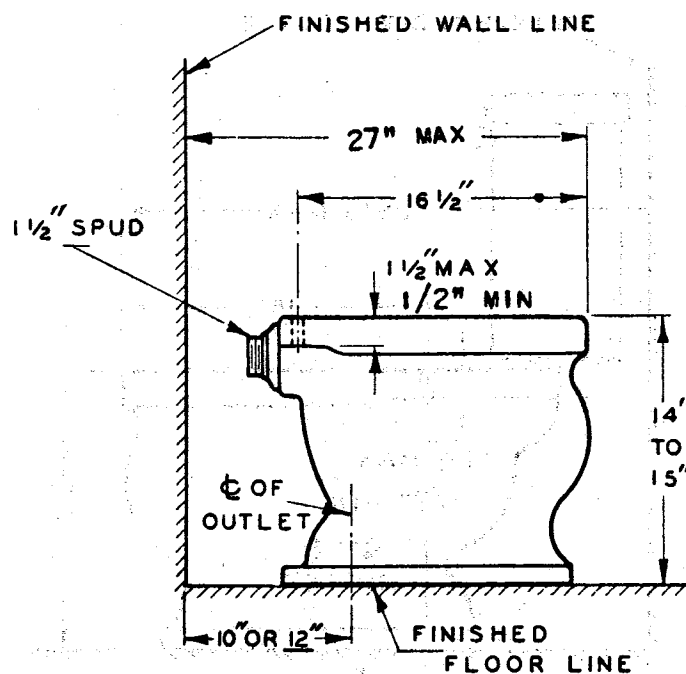
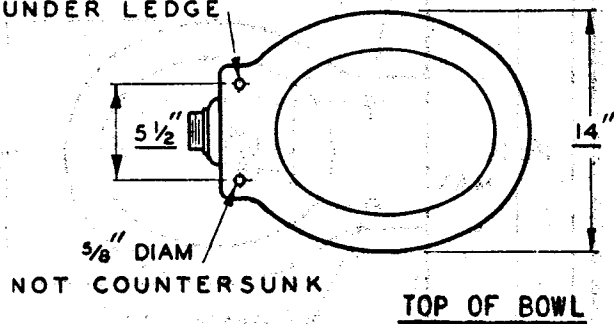


FIGURE 3. Washdown water-closet bowl for flush valve.

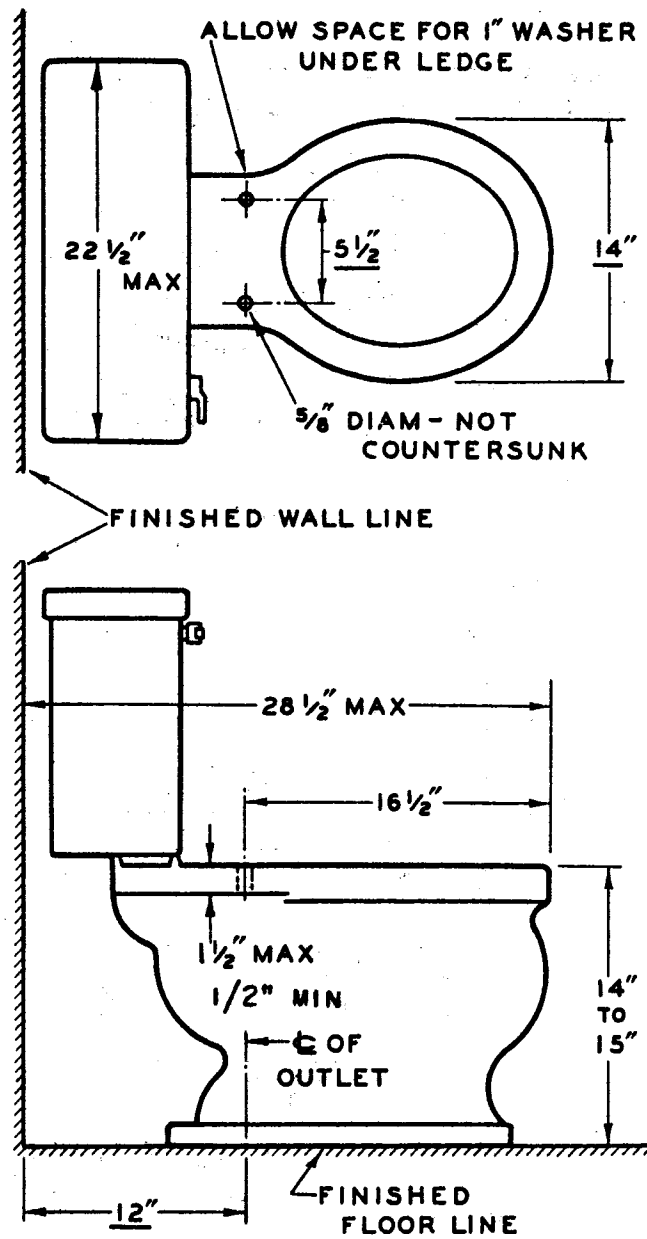


FIGURE 4. Close-coupled washdown water-closet combination.

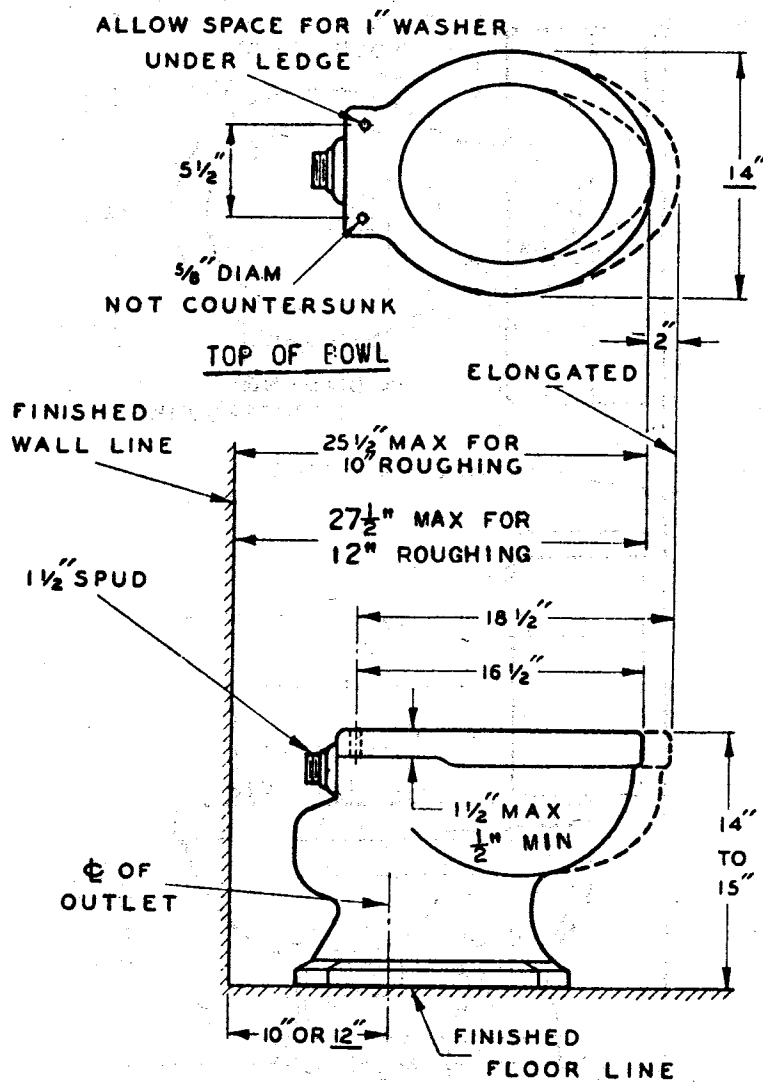


FIGURE 5. Reverse-trap water-closet bowl for flush valve.

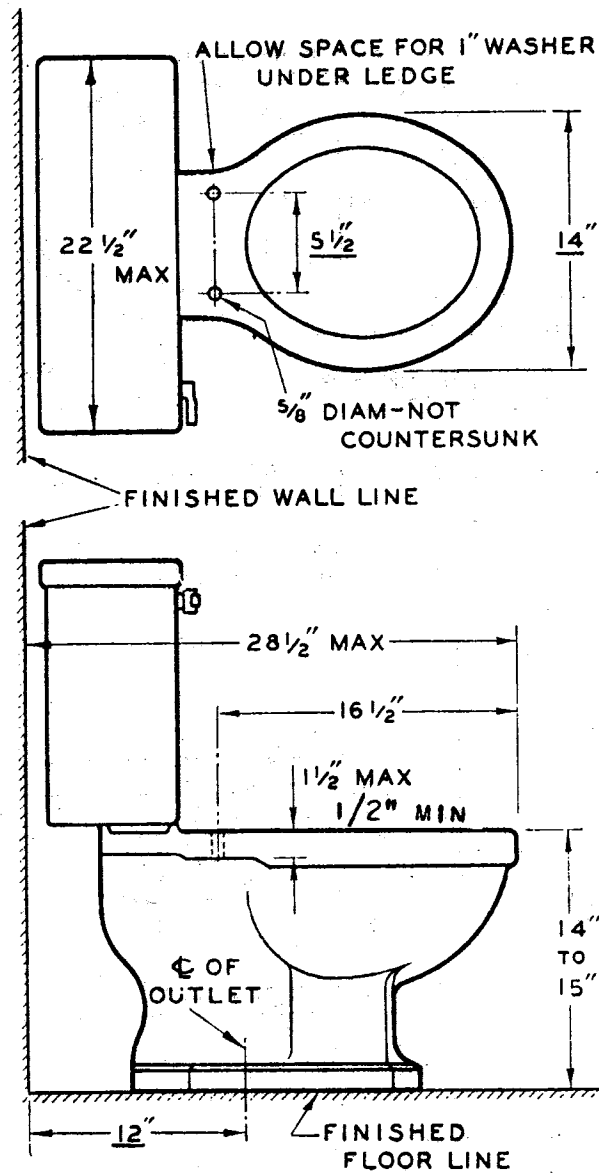


FIGURE 6. Close-coupled reverse-trap water-closet combination.

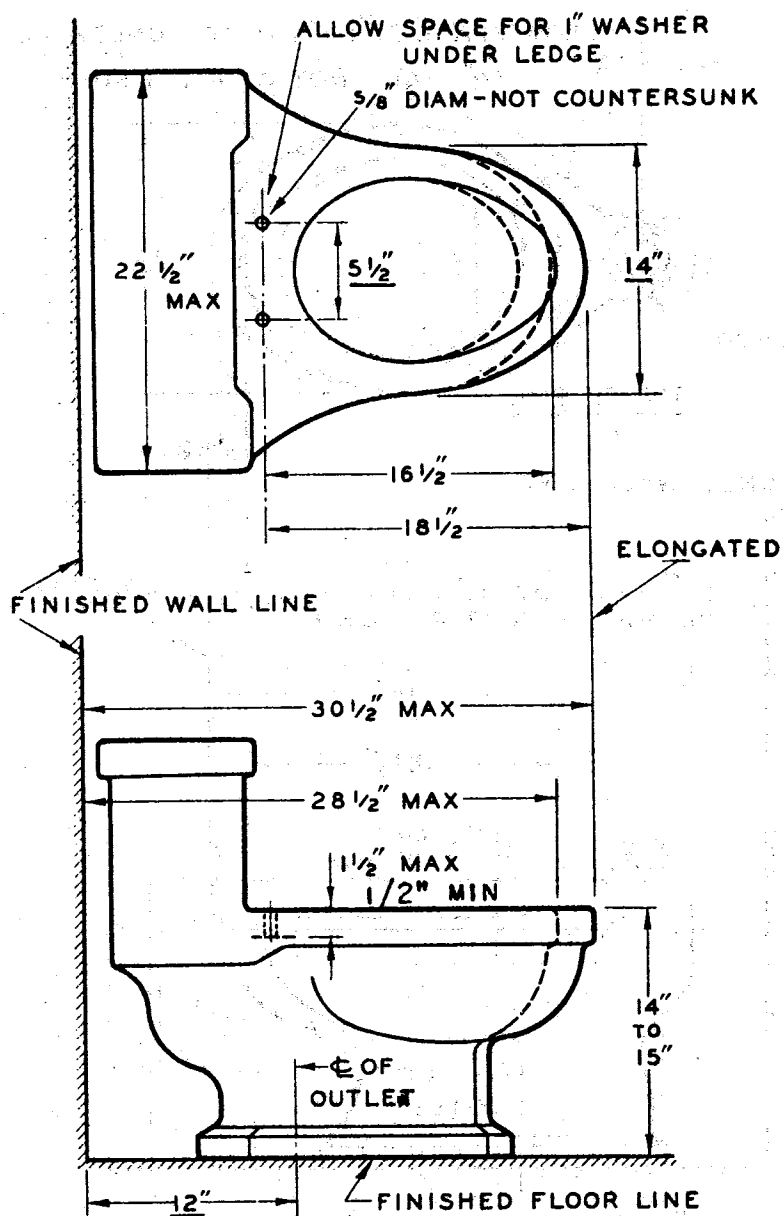


FIGURE 7. Integral reverse-trap water-closet combination.

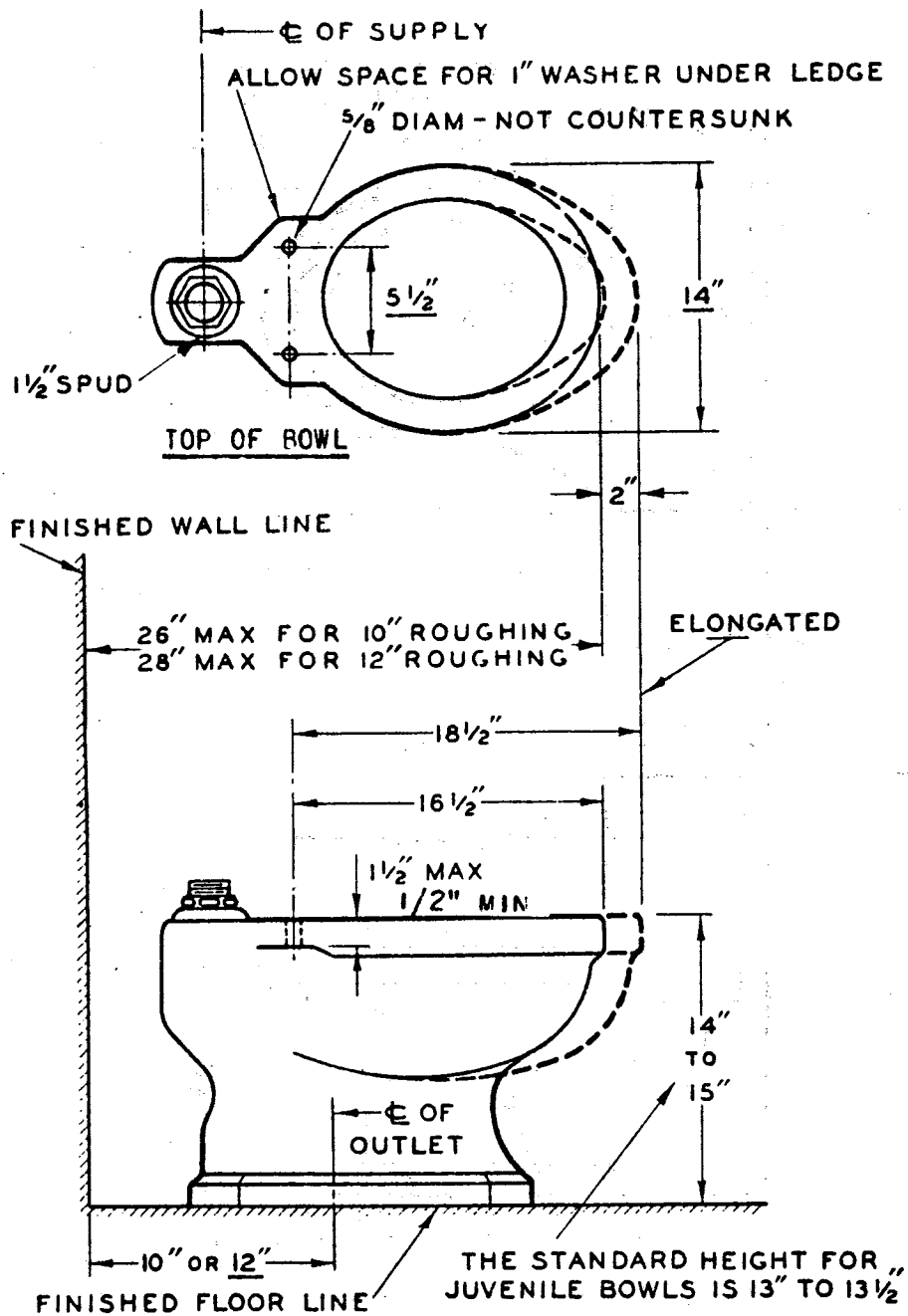


FIGURE 8. Siphon-jet water-closet bowl for flush valve.

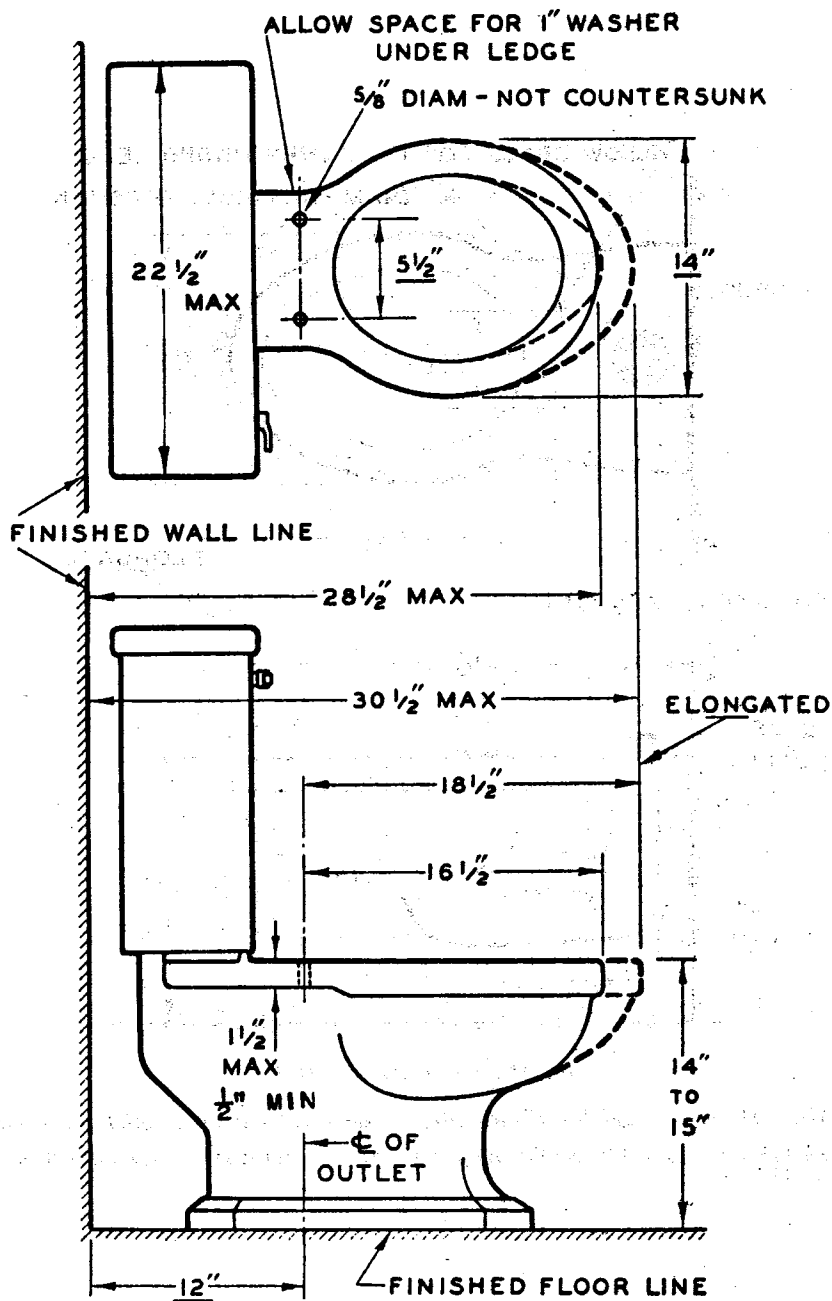


FIGURE 9. Close-coupled siphon-jet water-closet combination.

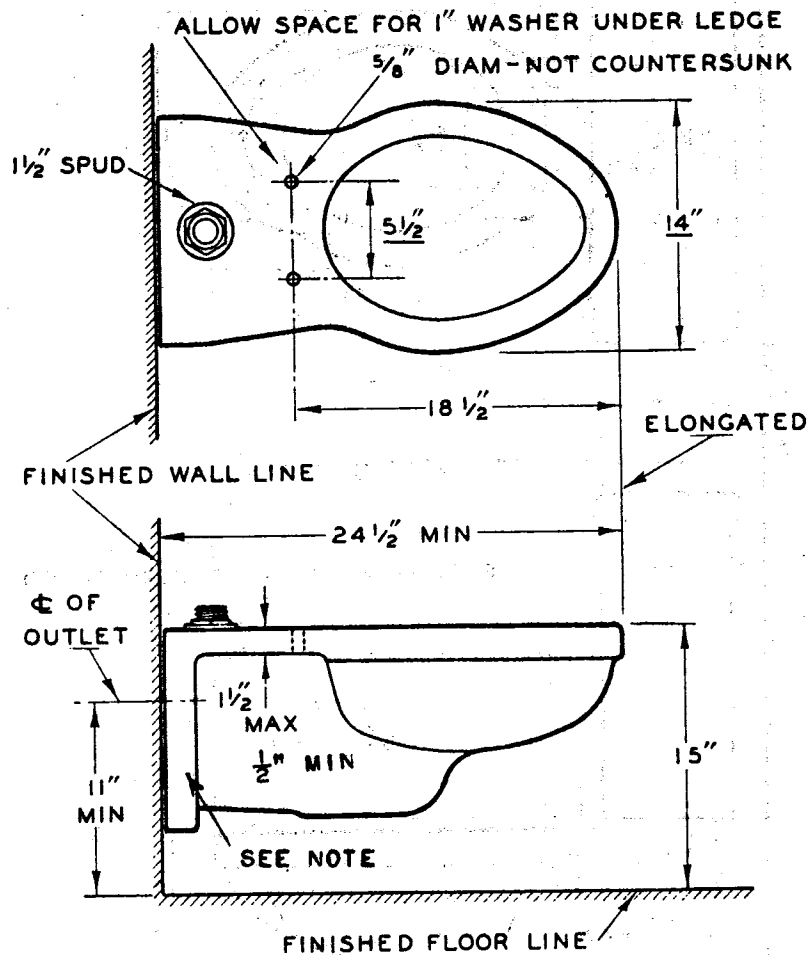


FIGURE 10. *Blowout wall-hanging water-closet bowl with top inlet for flush valve.*

Note. Hanger bolt holes 7/8 inch minimum diameter. For vertical spacing between bolt-hole centers, see paragraph 5.1.13.

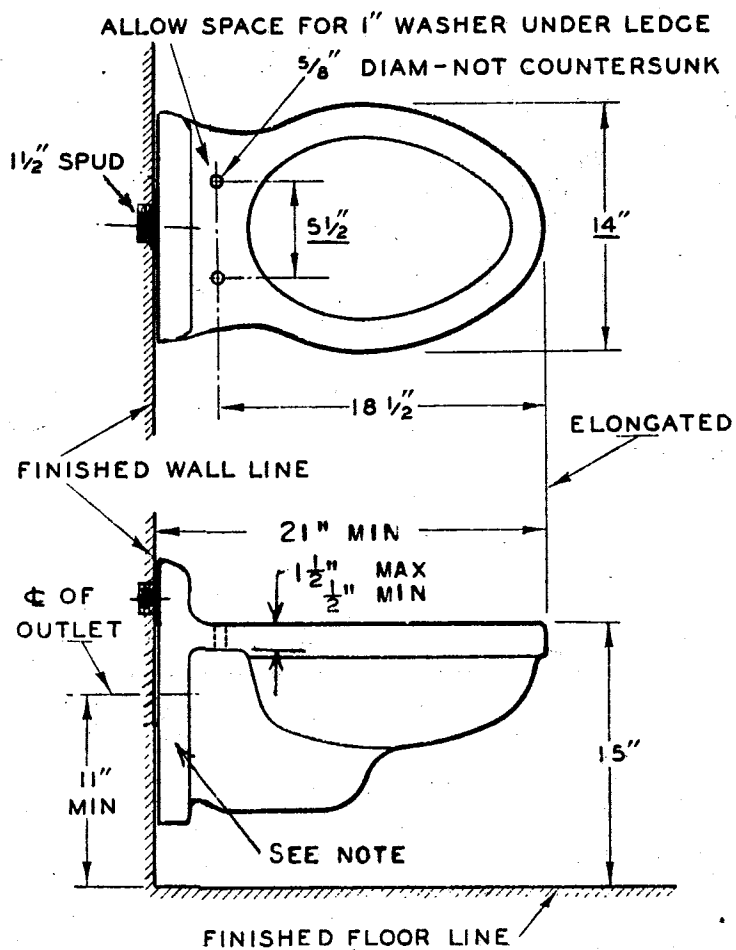


FIGURE 11. *Blowout wall-hanging water-closet bowl with back inlet for flush valve.*
 Note. Hanger bolt holes $\frac{5}{8}$ inch minimum diameter. For vertical spacing between bolt-hole centers, see paragraph 5.1.13.

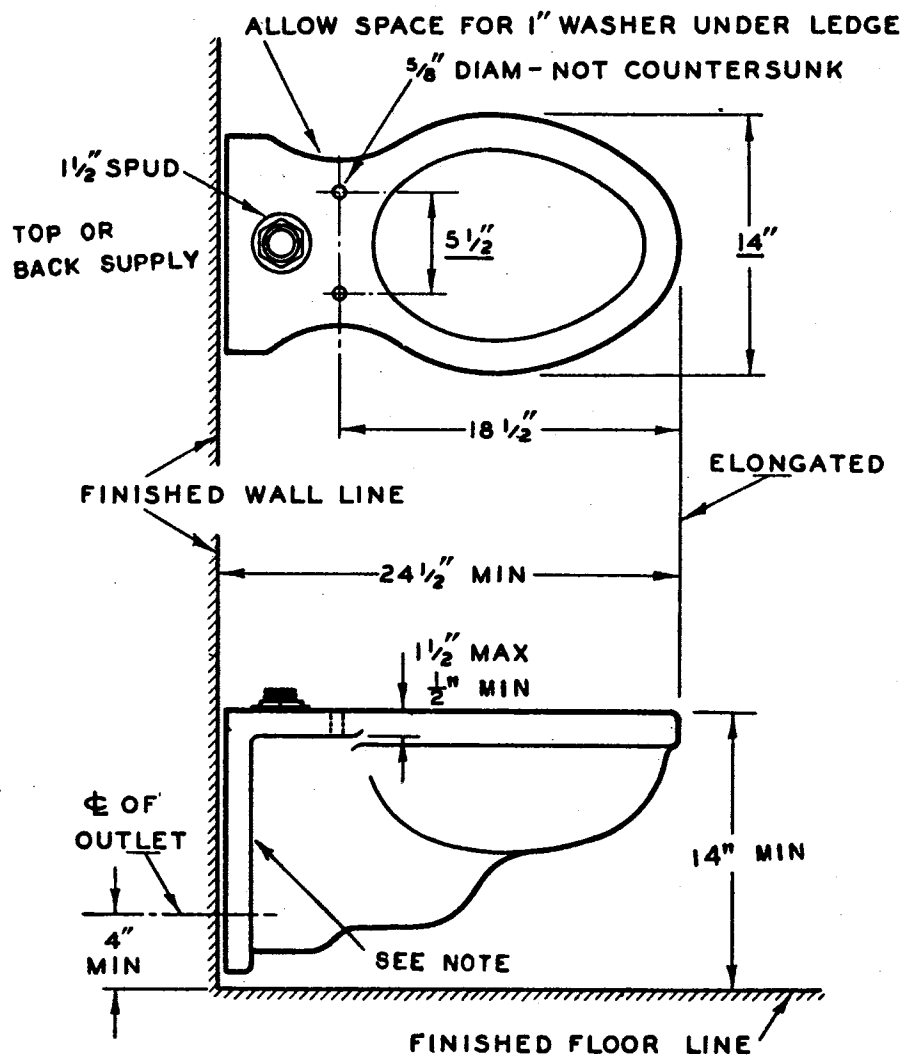
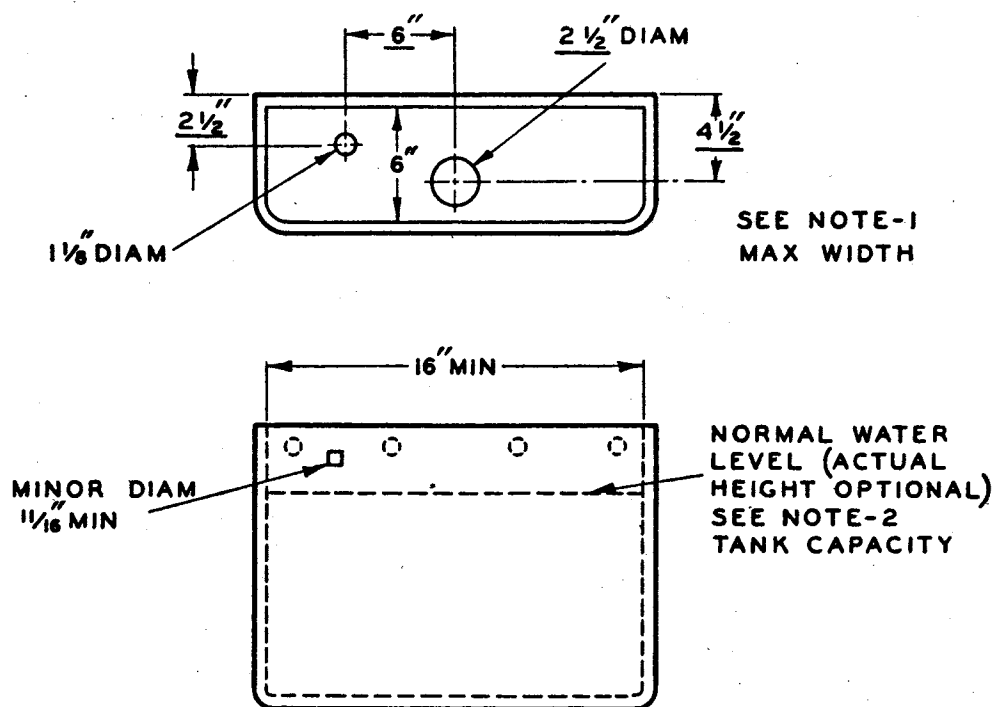


FIGURE 12. *Siphon-jet wall-hanging water-closet bowl for flush valve.*

Note. Hanger bolt holes 3/8 inch minimum diameter. For vertical spacing between bolt-hole centers, see paragraph 5.1.13.



DETAILS OF TANK WITH COVER REMOVED

FIGURE 13. Staple low tank (wall-hanging).

Note 1. Tank width over cover, 22 1/2 inches, maximum.

Note 2. Tank capacity shall be sufficient to properly flush the bowl with which it is furnished.

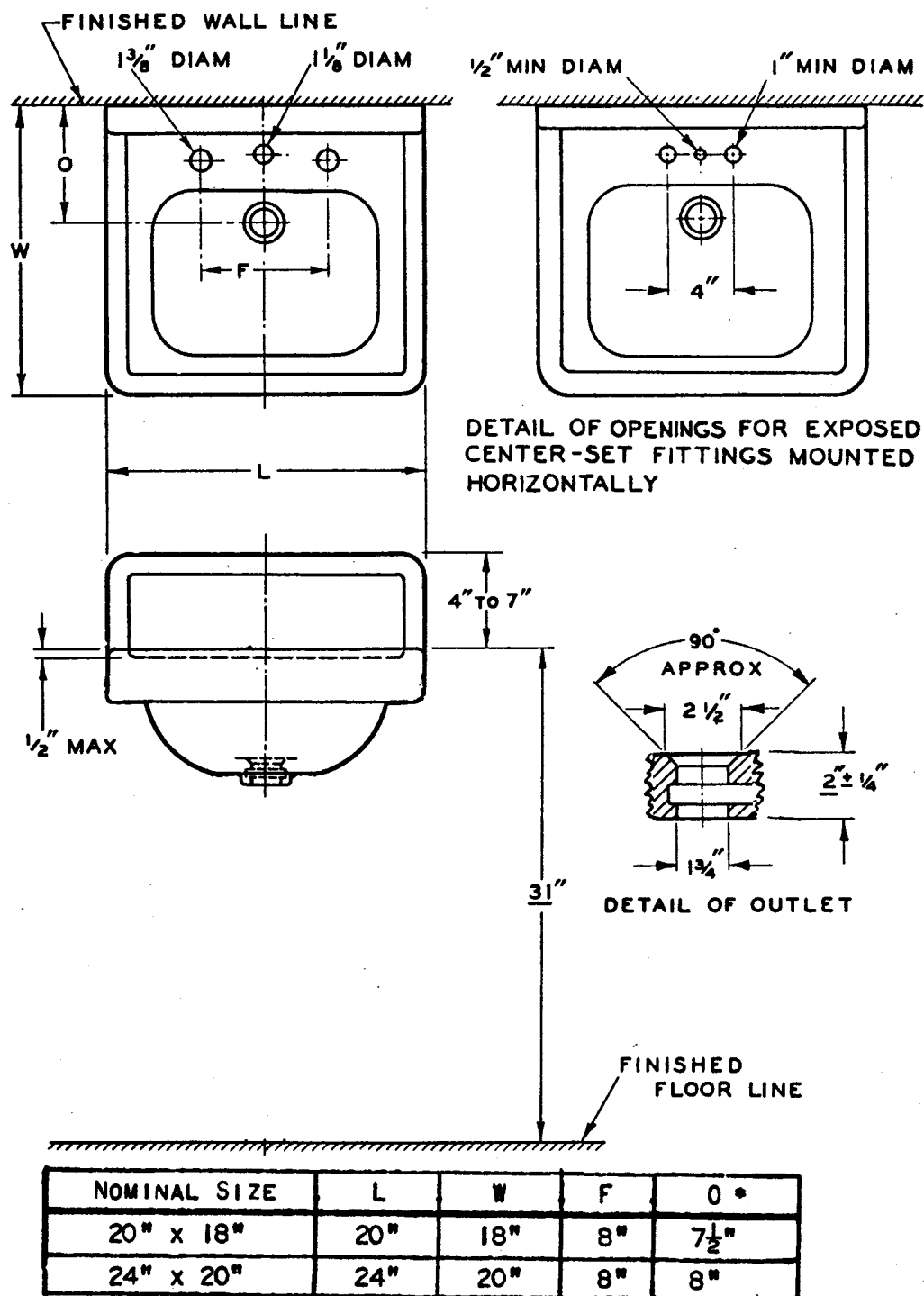


FIGURE 14. *Straight-front lavatories with back.*

*Tolerance, $\pm \frac{3}{4}$ inch on dimension O.

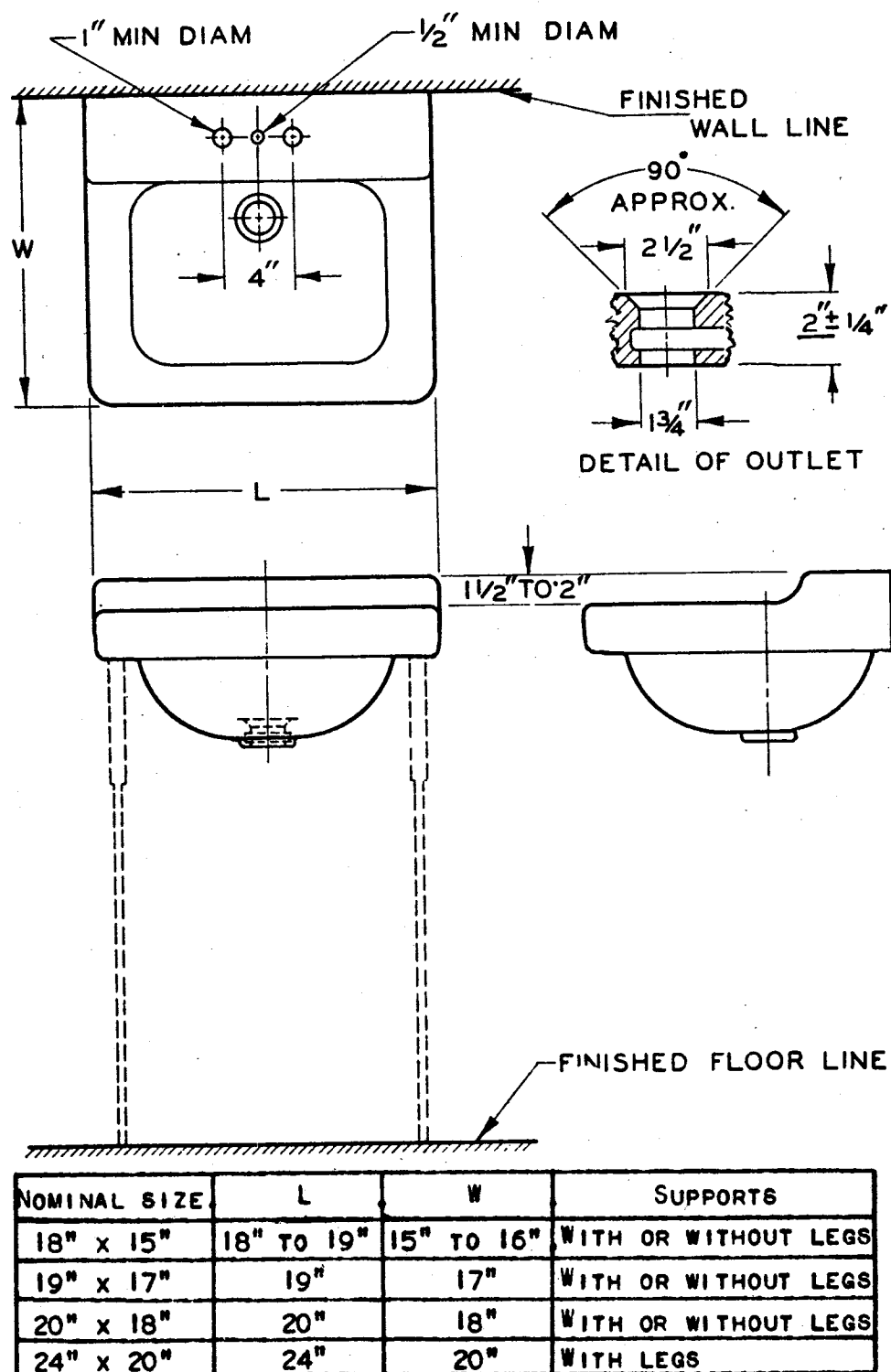
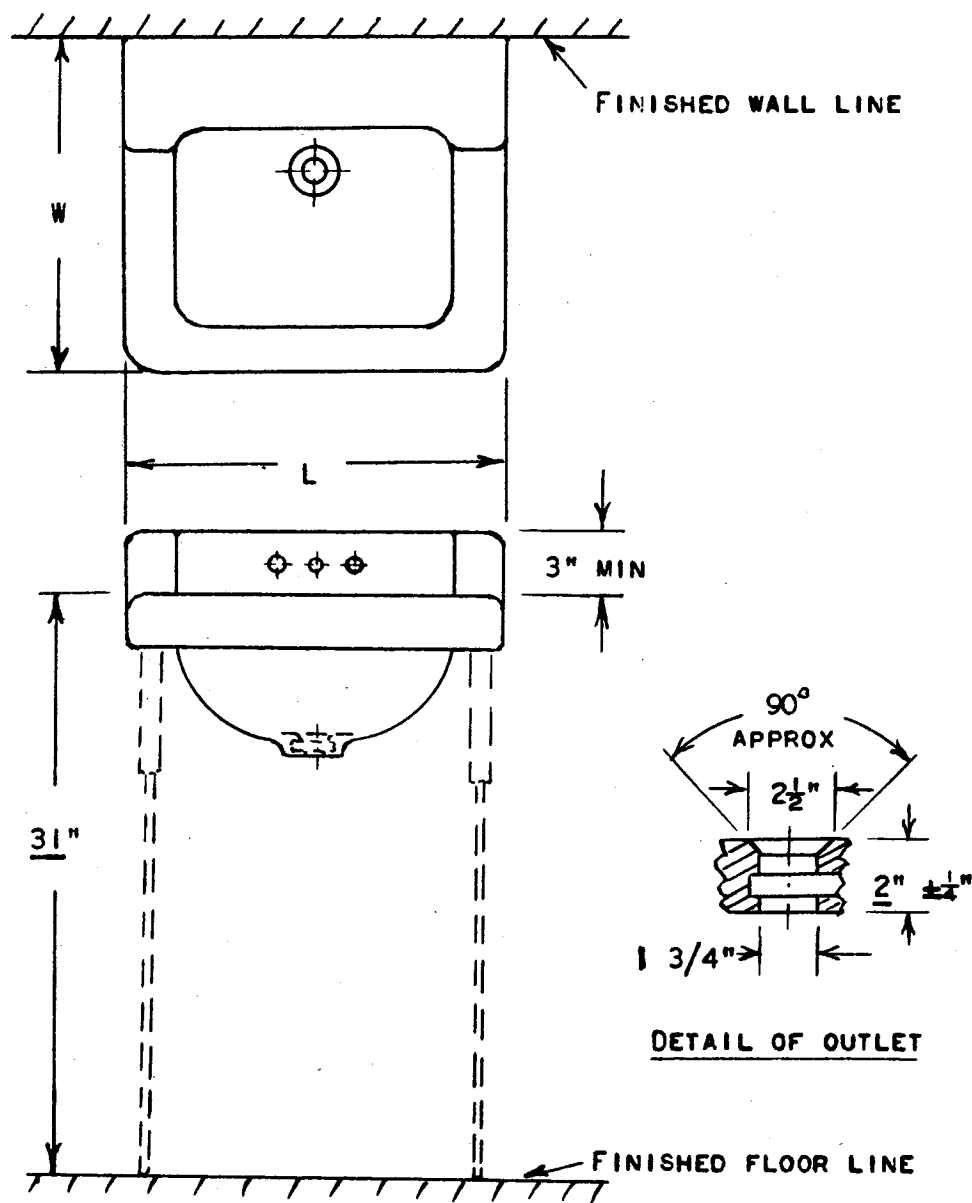


FIGURE 15. Ledge-back lavatories.



NOMINAL SIZE	L	W	SUPPORTS
18" x 15"	18"	15"	WITH OR WITHOUT LEGS
19" x 17"	19"	17"	WITH OR WITHOUT LEGS
20" x 18"	20"	18"	WITH OR WITHOUT LEGS
22" x 18"	22"	18"	WITH OR WITHOUT LEGS
24" x 20"	24"	20"	WITH LEGS

FIGURE 16. Shelf-back lavatories.

Note. Also made in sizes ranging from 12 by 12 inches to 30 by 22 inches, and up to 26 by 14 inches in several space-saver sizes.
Supply fittings shall be mounted on the top of or in front of the shelf, or on an inclined panel in front of the shelf.

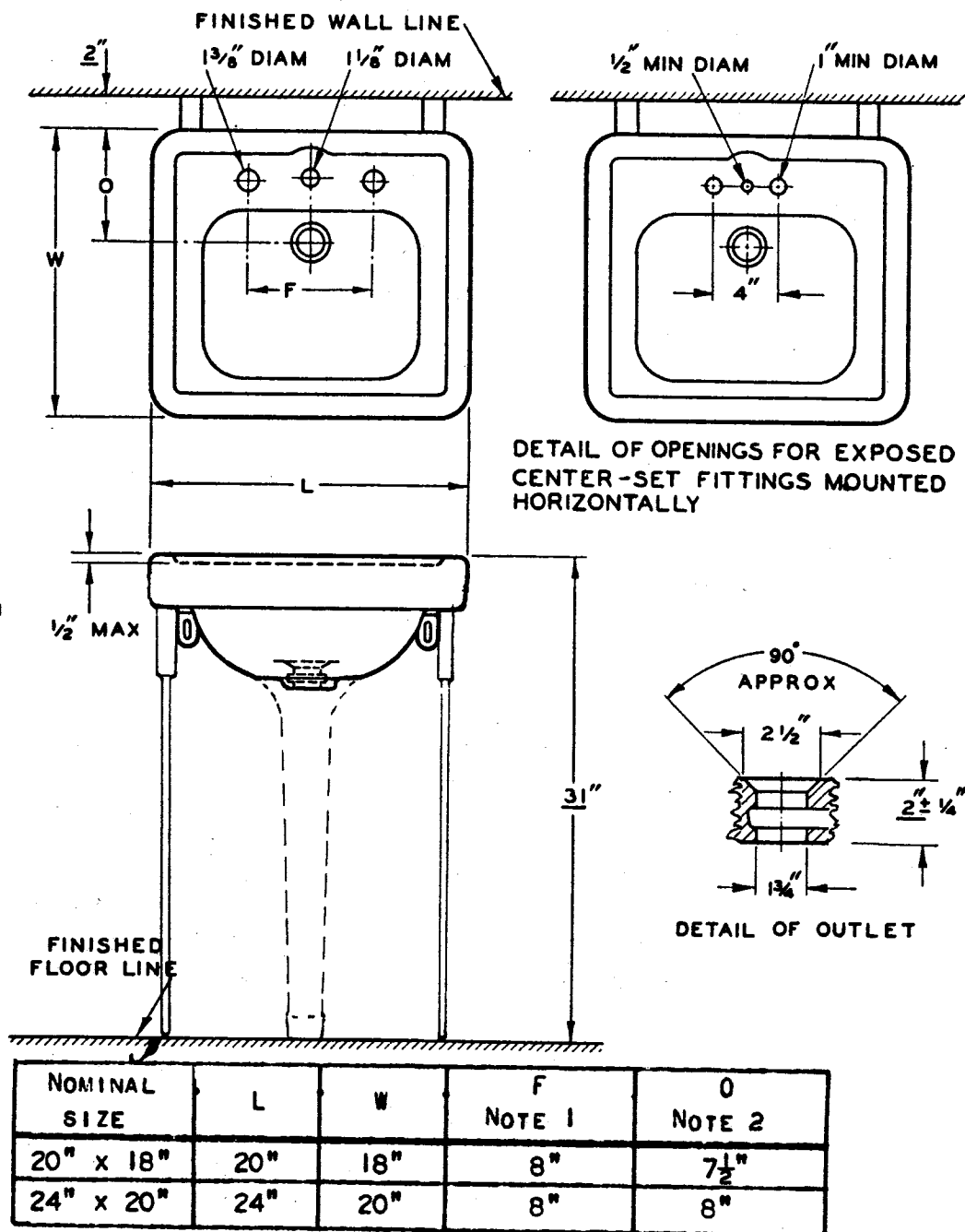


FIGURE 17. Slab-type lavatories.

Note 1. Dimension F may be 10 inches or 12 inches. (See par. 5.3.3.)

Note 2. Tolerance, $\pm\frac{1}{4}$ inch on dimension O.

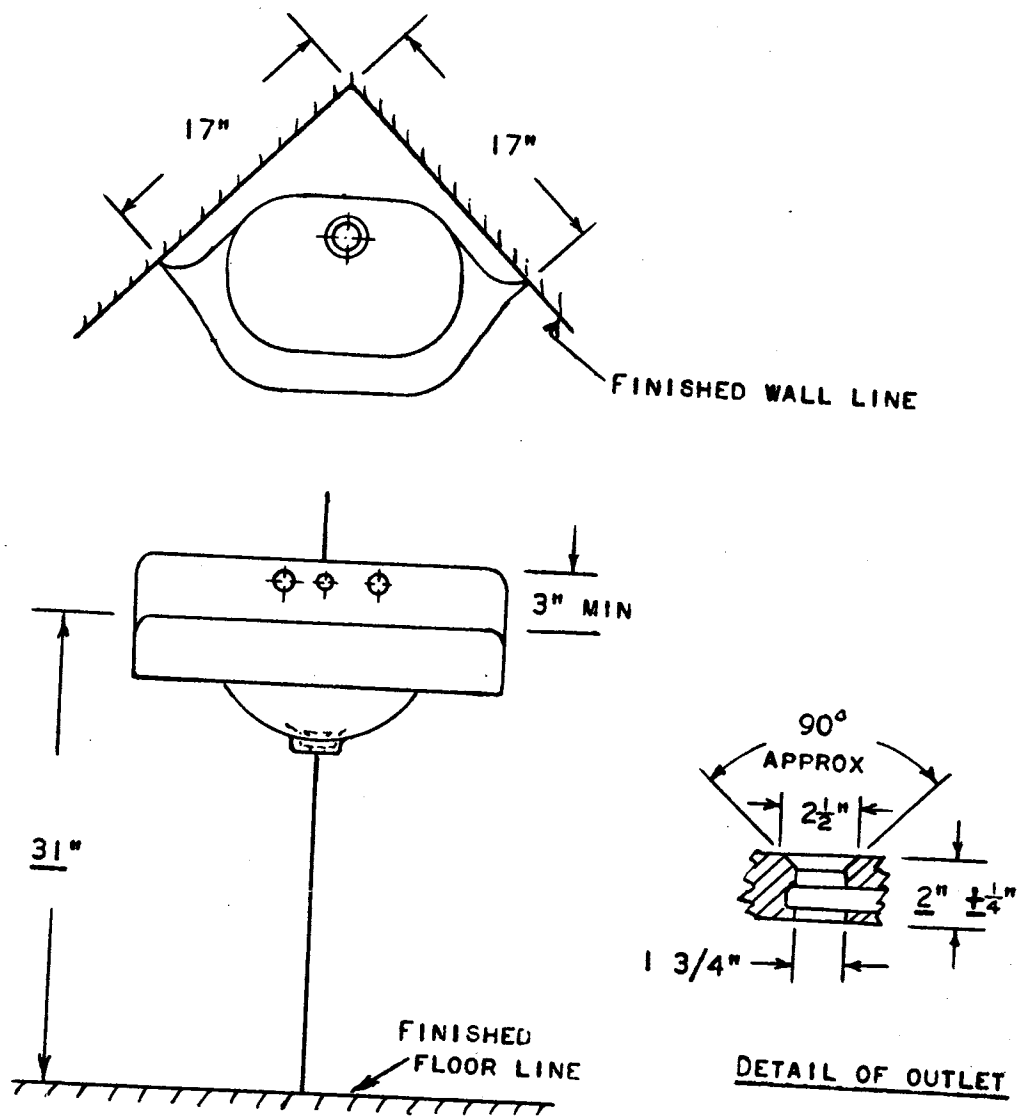
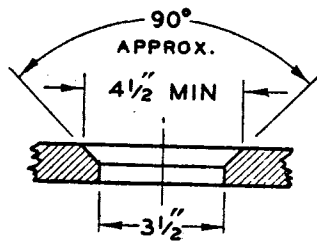
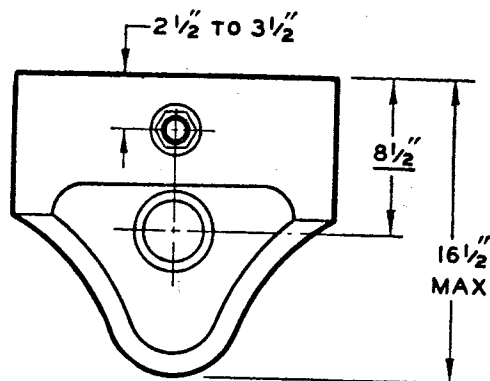


FIGURE 18. *Shelf-back corner lavatory.*

Note. Back may be with or without an inclined panel. Supply fittings may be mounted on the inclined panel, on top of the shelf, or in front of the shelf.



DETAIL OF OUTLET

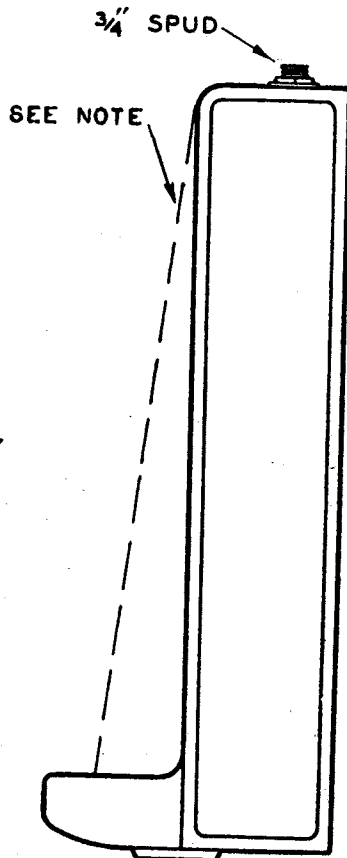
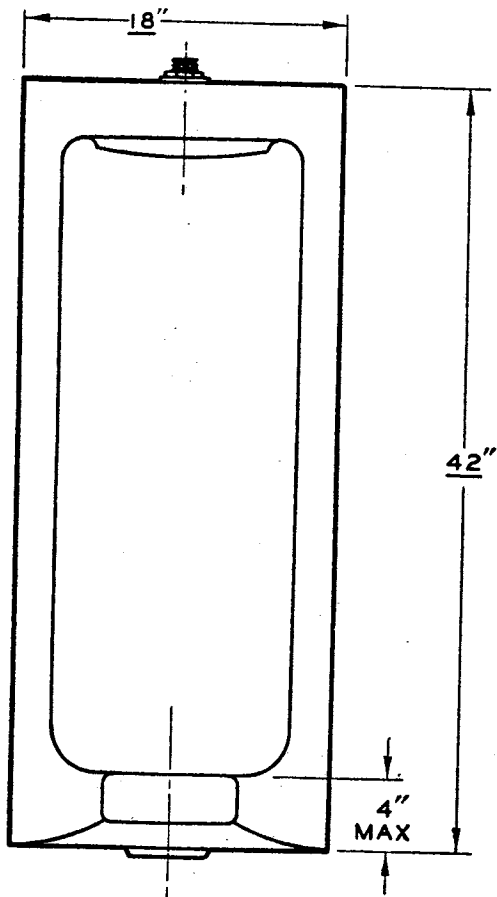


FIGURE 19. Stall urinal.

Note. Front either straight or sloped.

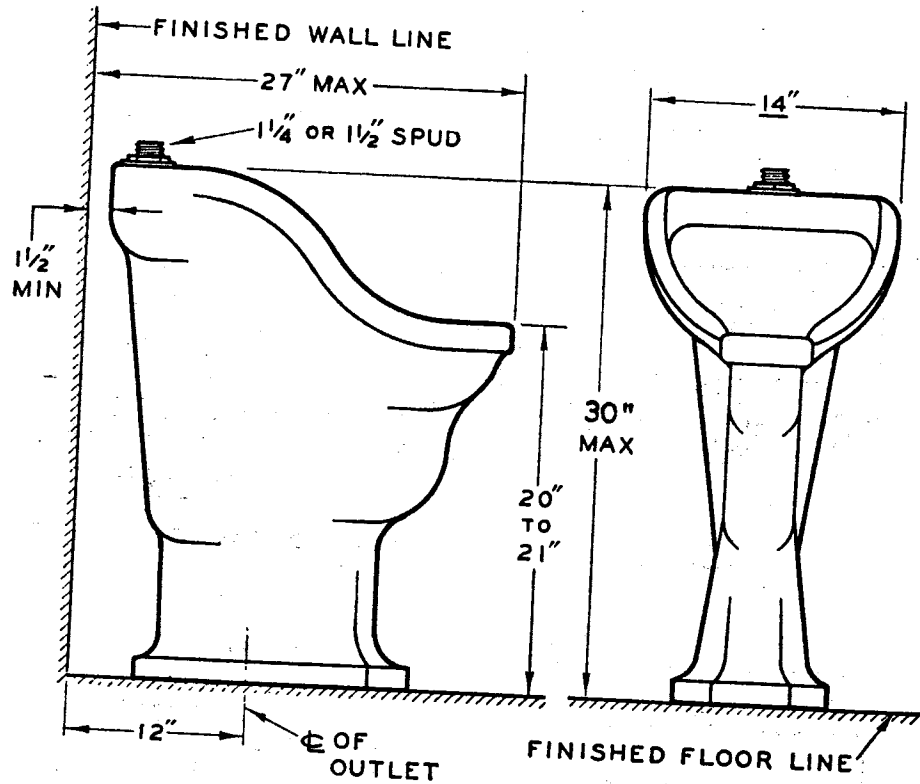


FIGURE 20. Top-supply pedestal urinal.

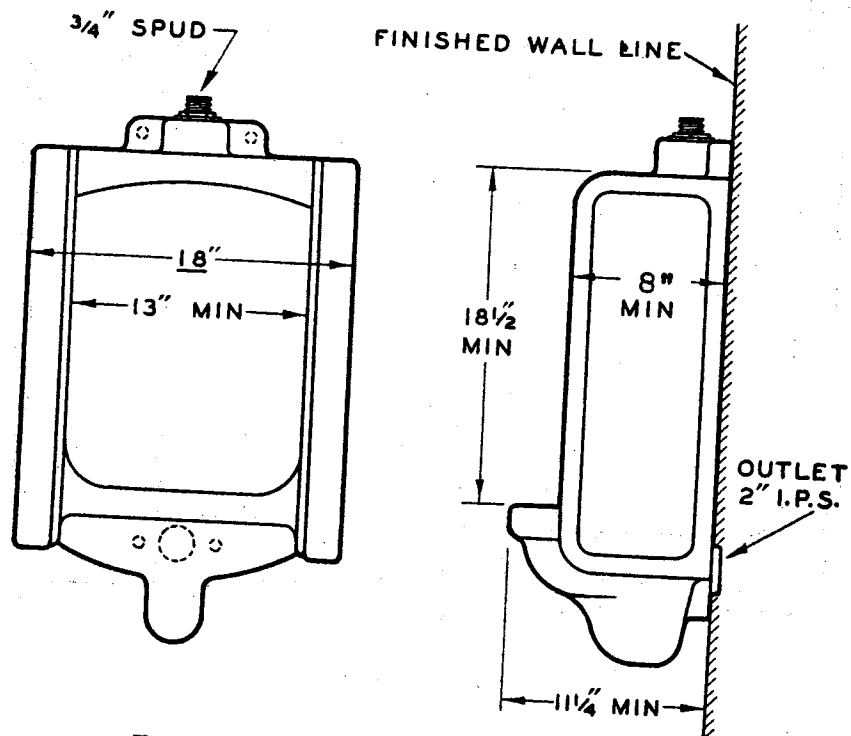


FIGURE 21. Wall-hanging washout urinal.

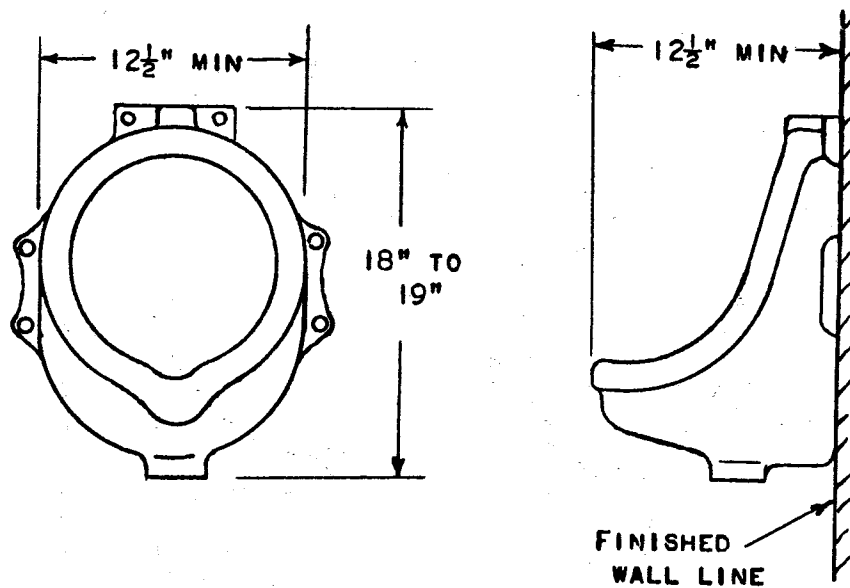


FIGURE 22. *Wall-hanging washout urinal with bottom outlet.*

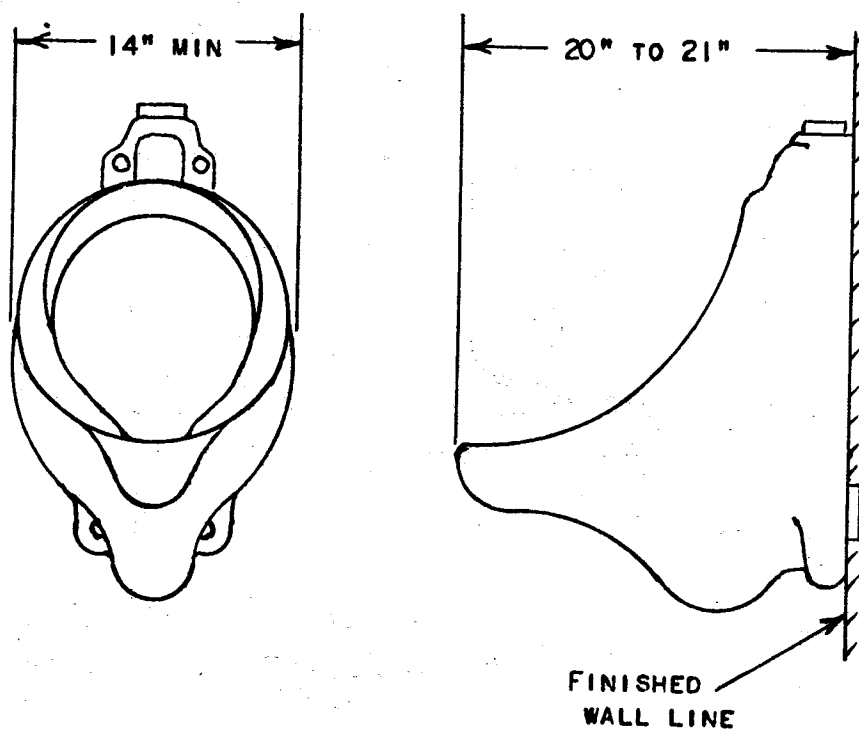


FIGURE 23. *Wall-hanging blowout urinal.*

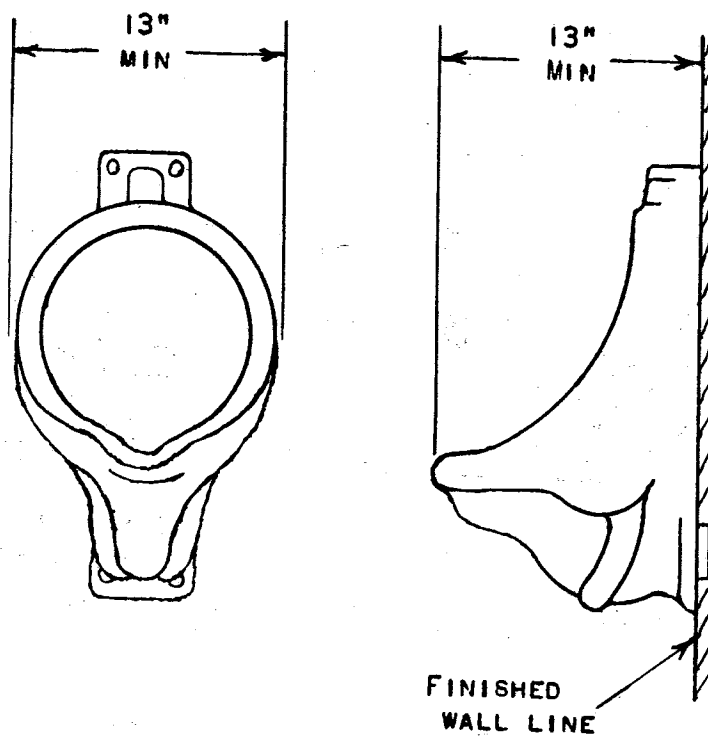


FIGURE 24. Wall-hanging siphon-jet urinal.

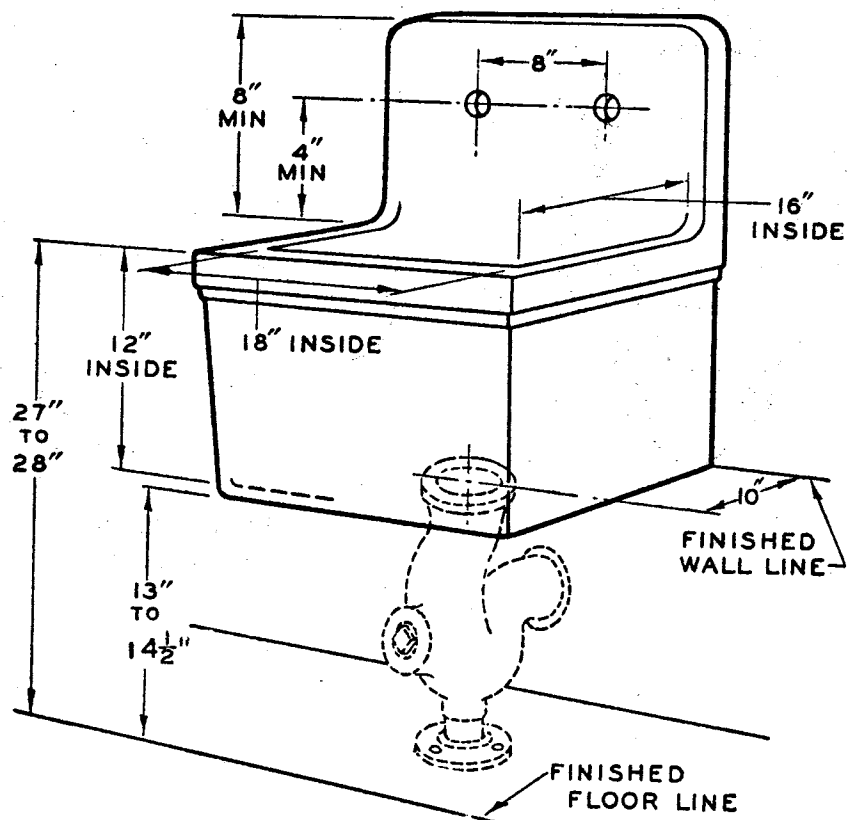


FIGURE 25. Service sink.

6. METHOD OF GRADING

6.1 It is not intended that inspectors shall measure or count any blemishes except in case of doubt, since, with practice, dimensional limits and numbers can be readily gaged by eye.

6.2 Water-closet bowls shall be examined for minor blemishes with the eyes of the observer about 2 feet directly above the rim while the fixture is rocked to either side and backward to an angle of about 45°. Minor blemishes not observed in this operation are assumed to be on unseen surfaces.

6.3 Water-closet bowls, urinals, sinks, laundry trays, service sinks, and all pedestals and legs shall be graded in accordance with table 1. Blemishes such as craze, dull or eggshell finish, dunts, fire checks, large blisters, and projections are not allowed. No exposed body is allowed on the flushing surface or on prominent surfaces.

6.4 Close-coupled tanks shall be graded in accordance with table 2. Examination shall be made with the eyes of the observer about 2 feet from the surface observed. No blemishes on the inside surface shall be counted. Minor blemishes on the outside surface, where hidden by the cover, shall not be counted. Blemishes such as craze, dull or eggshell finish, dunts, exposed body, fire checks, large blisters, and projections are not allowed.

6.5 Lavatories and drinking fountains shall be graded in accordance with table 3. The fixtures shall be examined with the eyes of the observer about 2 feet from the surface observed. (Pedestals and legs shall be graded the same as water-closet bowls.) Blemishes such as craze, dull or eggshell finish, dunts, exposed body, fire checks, large blisters, and projections are not allowed.

TABLE 1. *Maximum allowable blemishes for first-quality vitreous china water-closet bowls, urinals, sinks, laundry trays, service sinks, and all pedestals and legs*

Location	Blemish or defect	Maximum permitted
General	Wavy finish	Not more than 4 square inches.
	Warpage:	
	Water closets	Not noticeably warped when seat is attached.
	Other fixtures	Not more than ¼ inch per foot; total warpage not more than ½ inch.
Flushing surface	(Spots, blisters, and pinholes)	No segregation; a total of not over 5.
	(Bubbles or specks)	Not over 5 in 1 "pottery square"; a total of not over 10.
Visible surface	Exposed body	Not over ¼ inch on foot; none on more prominent surfaces.
	Spots, blisters, and pinholes	No segregation; a total of not over 5.
	Bubbles or specks	Not over 3 in 1 "pottery square"; a total of not over 10.

TABLE 2. *Maximum allowable blemishes for first-quality vitreous china close-coupled tanks and covers*¹

Location	Blemish or defect	Maximum permitted ¹
General	Warpage	Not noticeably warped.
Visible surface	Wavy finish	Not more than 4 square inches.
	Spots, blisters, and pinholes	No segregation; a total of not over 5.
	Bubbles or specks	Not over 3 in 1 "pottery square"; a total of not over 10.

¹ Covers shall show not more than 50 percent of the number of blemishes listed in table 2.

TABLE 3. *Maximum allowable blemishes for first-quality vitreous china lavatories and drinking fountains*

Location	Blemish or defect	Maximum permitted
General.....	Warpage.....	Warpage of slab out of horizontal plane not to exceed $\frac{1}{4}$ inch on all sizes. (Warpage of backs of lavatories which are attached to wall not to exceed $\frac{1}{8}$ inch.)
Service space, top of slab, inside of bowl, and front of apron.	{ Spots, blisters, and pinholes.....	No segregation; a total of not more than 2.
	{ Bubbles and specks.....	No segregation; a total of not more than 4.
	{ Polishing marks.....	Not more than 1 allowed.
Face of integral back and sides.	{ Spots, blisters, and pinholes.....	Not more than 1 on back or on either side; a total of not more than 3.
	{ Bubbles or specks.....	No segregation; a total of not more than 4.

6.6 For all vitreous china plumbing fixtures not specifically mentioned in the foregoing, the grading rules for water-closet bowls shall apply.

7. METHODS OF TEST

7.1 *Absorption test.*—Either the red-ink test or the boiling test as described below may be used, but in cases of dispute the boiling test shall be used.

7.2 *Red-ink test.*—A fractured piece of material taken from any part of a vitreous china plumbing fixture, after being immersed in red aniline ink of good color strength for 1 hour, shall not show any discoloration through the glaze and shall not show absorption, when broken, to a depth greater than $\frac{1}{8}$ inch below the surface of fracture at any point.

7.3 *Boiling test.*

7.3.1 The test sample shall be three fragments taken from any part of the fixture. Each fragment shall have approximately 5 square inches of surface area and a thickness of not more than $\frac{5}{16}$ inch. The pieces shall be dried to constant weight at $230^{\circ} \pm 10^{\circ}$ F, and shall then be stored in a desiccator until cooled to room temperature. After reaching room temperature, each specimen shall be weighed on a balance to an accuracy of 0.1 gram.

7.3.2 The weighed pieces shall then be placed in distilled water in a suitable vessel, supported so that they shall not be in contact with the heated bottom of the container, and boiled for 2 hours. They shall be allowed to remain in the water for 20 hours, then each dried slightly with a damp towel to remove excess water, and reweighed to an accuracy of 0.1 gram.

7.3.3 The absorption shall be reported as a percentage of the weight of the dried sample. The percentage for each test piece is obtained by dividing the weight of the water absorbed, in grams, by the weight of the dried test piece, in grams, and multiplying by 100. The average absorption of the three test pieces shall not exceed $\frac{1}{2}$ of 1 percent.

7.4 *Crazing test.*—A test specimen not more than $\frac{5}{16}$ inch thick by 5 inches square shall be suspended in a solution of equal portions, by weight, of anhydrous calcium chloride and water, and then boiled at a constant temperature of $230^{\circ} \pm 5^{\circ}$ F for $1\frac{1}{2}$ hours. It shall then be removed and immediately plunged into an ice-water bath at 36° to 38° F until chilled. The specimen shall then be soaked for 12 hours in a concentrated solution of methylene-blue dye, after which it shall

be examined for craze lines as indicated by penetration of the blue dye. No crazing is permissible.

7.5 *Flushing test for water-closet bowls.*

7.5.1 *Paper.*—The standard size paper to be used in this test is 4½ by 5 inches. If a smaller or a larger size is used, the load should be increased or decreased proportionately, based on the square inches of surface per sheet.

7.5.1.1 For interfold (pack type) toilet paper, six sheets in all are considered equivalent to one six-sheet strip of single-roll paper.

7.5.1.2 The "test load" for the flushing test shall be as given below, depending upon the absorption time of the paper used.

Paper absorption time, double-strip method, seconds	0 to 3	4 to 6	7 to 15
Number of crumpled six-sheet strips of single-thickness roll toilet paper	7	6	5

7.5.2 *Method of determining absorption time of paper.*—To determine the absorption time of roll toilet paper by the double-strip method, take two two-sheet strips of paper and place them together with perforations in line, and with curvature from roll in same direction to insure uniform contact.

7.5.2.1 These two strips shall then be placed gently on the surface of the water with convex side of paper down. The time in seconds shall be recorded from the moment the paper touches the water until a spot of moisture approximately ¼ inch in diameter appears on the upper strip. Spots appearing through imperfections in the paper or at edges shall be ignored. (This test can best be made in a lavatory basin or sink where light is usually better than in closet bowl.)

7.5.2.2 The absorption time of interfold (pack-type) paper shall be determined in the same manner as for roll toilet paper, after first cutting the interfold sheets where folded, then placing the two sheets on the surface of the water.

7.5.3 *Procedure for testing.*—The bowl shall be level, the trap and outlet clear, the bowl filled to weir level, the tank filled to the water line where marked and, in the absence of a mark, to a point 1 inch below top of overflow, and the float valve (ball cock) shall be adjusted to fill tank in not more than 3 minutes.

7.5.3.1 The given number of six-sheet strips of roll toilet paper, as determined by absorption time, shall each be crumpled into a loose ball measuring 2 to 3 inches in diameter, and dropped all together as a "test load" into the bowl and the bowl flushed immediately. The bowl shall flush similar "test loads" repeatedly.

7.5.3.2 If interfold (pack-type) paper is used, six sheets shall be crumpled into a ball in place of each six-sheet strip of roll paper, and the test shall be made as outlined above for roll paper.

7.5.3.3 No paper other than common toilet paper, coming within the absorption time range as mentioned above, shall be used for the test.

7.5.3.4 When water closet bowls to be tested are connected to direct-flushing valves, the control stop and valve should first be adjusted for best flushing action. The flow pressure (maintained at the flushing-valve inlet during test) shall not be less than:

- 10 pounds per square inch for siphon-action bowls.
- 20 pounds per square inch for blowout bowls.

7.6 *Method of determining warpage.*—The fixture shall be placed on a flat surface so as to ascertain the amount of deviation from the horizontal plane that exists at the edges of the fixture. If a feeler gage of thickness equal to the total allowable warpage will not slide under the fixture without forcing, the fixture satisfactorily comes within the warpage limitations. If the fixture will rock on 2 opposite high corners, the horizontal plane shall be determined by placing 1 feeler gage, of the total warpage allowed, under 1 low corner and forcing the fixture down on this gage. If a second feeler gage of the same thickness will not slide under the fixture at any other point, the fixture is not warped out of the horizontal plane by more than the specified tolerance, and satisfactorily comes within the warpage limitations.

8. MARKING AND LABELING

8.1 All vitreous china plumbing fixtures shall be plainly and permanently branded for identification with the name or trade-mark of the manufacturer, and date of manufacture.

8.2 Labels shall be used only on ware that conforms to the requirements for "first quality" as set forth in this standard. It is recommended that manufacturers include the following statement, in conjunction with their name and address, on labels, invoices, guarantees, sales literature, etc.:

This VITREOUS CHINA plumbing fixture is first quality, and complies with the requirements and tests of Commercial Standard CS20-56, as developed by the trade under the procedure of the Commodity Standards Division, and issued by the U. S. Department of Commerce.

8.3 The industry has been embarrassed and the consumer victimized by unscrupulous distributors selling "second" grade fixtures as "first quality" fixtures. To prevent the possibility of this unfair practice,

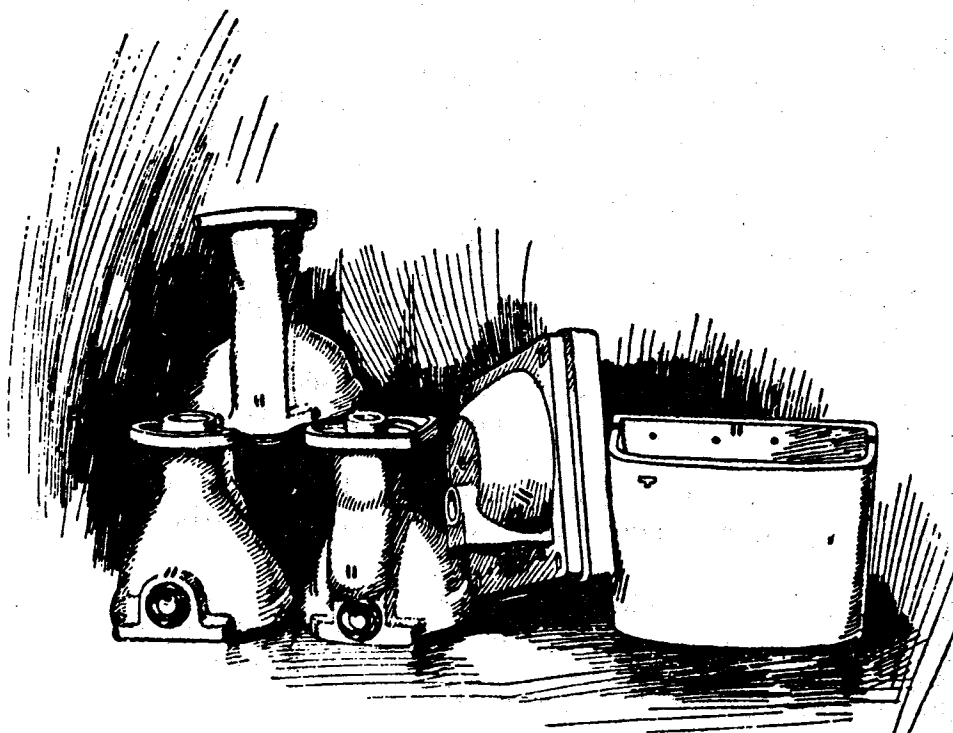


FIGURE 26. Location and character of marking for seconds.

all "second" grade ware shall be indelibly marked by the maker with two parallel lines cut through the glaze into the body of the ware at the location (see fig. 26) recommended by the Plumbing Fixture Manufacturers Association. These cuts shall be filled with a bright red varnish or enamel which is resistant to the action of hot water. No labels shall be placed on "seconds."

8.3.1 All packages containing "seconds" shall be marked with two splashes of red on one end of the package, so as to be visible without tearing down stacks of packages.

9. NOMENCLATURE AND DEFINITIONS

9.1 Nomenclature and definitions applicable to vitreous china plumbing fixtures are as follows:

Blister.—A raised portion of the surface $\frac{1}{32}$ (0.031) inch up to $\frac{1}{8}$ (0.125) inch in maximum dimension.

Large blister.—A raised portion of the surface $\frac{1}{8}$ (0.125) inch to $\frac{1}{4}$ (0.25) inch, inclusive, in maximum dimension.

Bubble.—A raised portion of the surface or a sand speck smaller than $\frac{1}{32}$ (0.031) inch in maximum dimension.

Craze.—Fine cracks in the glaze.

Discoloration.—A colored spot over $\frac{1}{4}$ (0.25) inch in maximum dimension or a sufficient number of specks or spots to give the effect of a change in color.

Dull or eggshell finish.—Dead or flat finish. Undeveloped glaze. A semiglazed finish with numerous very fine pinholes, or slightly matted in appearance. Not glossy.

Dunt.—A hairline fracture extending through the body, and caused by strains set up in the process of manufacture.

Elongated water-closet bowl.—Water-closet bowl having an elongated top contour as shown in figure 2.

Exposed body.—Unglazed portion $\frac{1}{16}$ (0.063) inch or more in maximum dimension.

Finish.—Texture and condition of surface other than color.

Fire check.—Fine shallow crack in the body not covered with glaze. (When sufficiently covered with glaze so as to be easily cleaned, it is not detrimental.)

First quality.—First-class ware in conformity with the grade limitations and other requirements of this standard.

Fittings.—Adjuncts to a fixture subject to selection or option of the purchaser, as, for example, faucets and waste plugs.

Fixture.—The china piece only, without trimmings and/or fittings.

Flushing surface.—The surface, visible after installation, which may be wet during the operation of the fixture.

Integral.—A part cast integrally with the fixture, such as bubbler, trap, seat, or tank.

Ledge back.—A flat ledge at the back of a lavatory or sink, not more than 2 inches higher than the rim and extending the full length of the fixture, on which the supply fitting can be mounted and small articles placed; or a similar construction with a center panel suitable for mounting a supply fitting.

Pinhole.—A small hole in the glazed surface under $\frac{1}{16}$ (0.063) inch in maximum dimension.

Polishing mark.—A spot not larger than $\frac{3}{8}$ (0.375) inch in maximum dimension where some minor blemish has been ground off and the surface polished.

Pottery square.—A square 2 inches on each side. For grading purposes, it may be a 2-inch square hole cut in a small sheet of any flexible material, such as rubber or paper, for convenience in sliding over irregular surfaces to determine segregation.

Projection.—A raised portion of the surface over $\frac{1}{4}$ (0.25) inch in maximum dimension.

Regular (round front) water-closet bowl.—A water-closet bowl having a round front rim. See figure 2.

Roughing-in measurement.—Dimension from finished wall or floor to center of waste or supply opening.

Seconds.—Serviceable ware which grades below "first quality" but which is safe from a health or a sanitary point of view.

Segregation.—More than four spots, blisters, or pinholes in any pottery square.

Shelf back.—A flat elevation at the back of a lavatory, higher than 2 inches above the rim and extending the full length of the fixture, on the top or front of which the supply fitting can be mounted and on which small articles can be placed; or a similar construction with a center panel formed into the shelf suitable for mounting a supply fitting.

Speck.—An area of contrasting color less than $\frac{1}{32}$ (0.031) inch in maximum dimension. Specks less than $\frac{1}{100}$ (0.01) inch in maximum dimension, unless in sufficient number to form a discoloration, are not counted.

Spot.—An area of contrasting color $\frac{1}{32}$ (0.031) inch up to $\frac{1}{8}$ (0.125) inch in maximum dimension.

Large spot.—An area of contrasting color $\frac{1}{8}$ (0.125) inch to $\frac{1}{4}$ (0.25) inch, inclusive, in maximum dimension.

Spud.—A threaded brass connection inserted in the vitreous chinaware.

Tank.—The term "tank" shall be applied to any vitreous china fixture which contains water to flush another plumbing fixture.

High tank.—A tank designed to be mounted with bottom more than 2 feet above the floor.

Low tank.—A tank designed to be mounted with bottom 2 feet or less above the floor.

Trap.—A fitting or device so designed and constructed as to provide when properly vented, a liquid seal which will prevent the back passage of air without materially affecting the flow of sewage or waste water through it.

Trimmings.—Parts, other than china, regularly supplied with fixture, as, for example, closet spuds, wall hangers, and tank trim. Trimmings do not include fittings.

Visible surface.—The surface which, after installation of the fixture is readily visible to an observer in a normal standing position.

Vitreous.—That degree of vitrification evidenced by not more than 0.5 percent absorption in the boiling test. See paragraph 7.3.

Vitreous china (as applied to plumbing fixtures).—Compounded ceramic materials fired at high temperature to form a vitreous body with exposed surfaces coated with ceramic glaze fused to the body. Vitreous china does not craze or peel, and the body does not absorb water in excess of $\frac{1}{2}$ of 1 percent of its weight.

Water surface.—The surface of the still water in the water-closet bowl, when filled to the top of the dam.

Water-closet bowl.—The term "water-closet bowl" is the accepted general term applicable to such fixtures, whether a single piece or part of a "combination."

Water-closet combination.—The term "water-closet combination" applies to a water-closet bowl with means for flushing.

Wavy finish.—A defect in the finish having the appearance of numerous runs in the glaze; irregular or mottled.

Well.—A pocket, open at top, formed inside a water-closet bowl at the entrance to the trap.

10. RECOMMENDATIONS

10.1 *Roughing-in dimension.*—It is recommended that the industry work towards one standard roughing-in dimension for water-closet bowls, and that this dimension be 12 inches.

10.2 *Control valves (stops).*—It is recommended that control valves (stops) be installed with every vitreous china fixture to (1) regulate stream flow, (2) conserve water, (3) reduce noise, (4) prevent spattering, and (5) to provide handy means for stopping flow if faucet leaks, and for replacing faucet washer.

10.3 *Maximum water working pressure.*—The recommended maximum water working pressure for the operation of vitreous china plumbing fixtures is 85 pounds per square inch.

10.4 *Bolt holes in flush tanks.*—The recommended diameter of holes in flush tanks for bolts that connect tank to bowl is $\frac{3}{8}$ inch minimum and $\frac{1}{2}$ inch maximum.

10.5 *Protection of fixtures against abuse.*—In line with good plumbing practice, it is recommended that the following paragraph be included in architects' and builders' specifications:

The plumbing contractor shall provide protection for the surfaces of all plumbing fixtures from damage before, during, and after their installation and until his work is completed and accepted. Contractors and subcontractors shall not use plumbing fixtures for the storage of tools or materials, nor as a support or platform. Every precaution shall be taken during the period of construction to avoid damage to fixtures and fittings.

11. EFFECTIVE DATE

11.1 Having been passed through the regular procedure of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard was issued by the United States Department of Commerce, effective from April 1, 1956.

EDWIN W. ELY,

Chief, Commodity Standards Division

HISTORY OF PROJECT

General conference.—Pursuant to a request from the industry and following several preliminary conferences of interested manufacturers, a public conference was held on September 22, 1926, which resulted in the establishment of Simplified Practice Recommendation R52, Staple Vitreous China Plumbing Fixtures. On recommendation of the standing committee, this was expanded and superseded by a pamphlet entitled "Staple Vitreous China Plumbing Fixtures, Commercial Standard CS20-30."

First revision.—The Vitreous China Plumbing Fixtures Association submitted recommended revisions on February 10, 1936, which were

subsequently approved by the standing committee, and on April 28, 1936, were circulated to all concerned for written acceptance. As announced to the trade on June 30, 1936, the revised standard was accepted as Commercial Standard CS20-36.

Second revision.—On January 8, 1942, the Vitreous China Plumbing Fixtures Association submitted recommendations for revision of the standard to include several additional items and tests. With the approval of the standing committee, the revision was circulated to the industry on May 4, 1942, and following receipt of adequate acceptance, the third edition, CS20-42, was announced on June 10, 1942.

Third revision.—Further changes were recommended on April 19, 1946, by the Vitreous China Plumbing Fixtures Association, in line with developments in the industry. Upon circulation to the industry on December 27, 1946, following approval by the standing committee, the revision was accepted in writing by a satisfactory majority, and the fourth edition was announced on June 12, 1947.

Fourth revision.—Recommendations for bringing the standard into line with changes in industry practice were submitted under date of March 29, 1948. Among other modifications, the designation "seconds" was substituted for "culls." After endorsement by the standing committee, the revision was circulated to the industry on June 24, 1949, and upon receipt of sufficient acceptances, the fifth edition, CS20-49, was announced on November 15, 1949.

Fifth revision.—Further developments in industry practices and manufacturing processes were reflected in a revision proposed on November 3, 1954, by the Vitreous China Plumbing Fixtures Association, a predecessor of the present Plumbing Fixture Manufacturers Association. After consideration by the standing committee, and adjustment to meet the committee's recommendations, the standard was circulated on April 18, 1955, for acceptance. Following approval of the revision by a satisfactory majority, the sixth edition of the standard, CS20-56, was announced on March 1, 1956.

Project Manager: A. S. Best, Commodity Standards Division, Office of Technical Services.
Technical Adviser: R. F. Geller, Mineral Products Division, National Bureau of Standards.

STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, which acts as secretary for the committee.

- A. G. ZIBELL, Kohler Co., Kohler, Wis. (Chairman).
- D. J. QUINN, American Radiator & Standard Sanitary Corp., New York 18, N. Y.
- W. P. KLIMENT, Crane Co., Chicago 5, Ill.
- B. B. PIESLAK, Abingdon Potteries, Inc., Abingdon, Ill.
- JOHN MADDEN, Jas. B. Clow & Sons, Chicago 80, Ill.
- EDWARD F. MAURER, F. R. Dengel Co., Milwaukee 3, Wis.
- S. M. STROH, Hajoca Corp., Philadelphia 1, Pa.
- JOE W. PITTS, Brown-Roberts Hardware & Supply Co., Ltd., Alexandria, La.
- THEODORE IRVING COE, American Institute of Architects, Washington 6, D. C.
- ROALD GLESNE, Methodist Hospital, Gary, Ind. (representing American Hospital Association).
- H. L. STEVENS, Stevens, Inc., Hutchinson, Kans. (representing National Association of Plumbing Contractors).

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

Date _____

Commodity Standards Division,
Office of Technical Services,
U. S. Department of Commerce,
Washington 25, D. C.

Gentlemen:

We believe that this Commercial Standard constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production¹ distribution¹ purchase¹ testing¹

of vitreous china plumbing fixtures. We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those products which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer _____

(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer _____

Organization _____

(Fill in exactly as it should be listed)

Street address _____

City, zone, and State _____

¹ Underscore the one that applies. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations and firms listed below have individually accepted this standard for use as far as practicable in the production, distribution, purchase, or testing of vitreous china plumbing fixtures. In accepting the standard they reserved the right to depart from it as they individually deem advisable. It is expected that products which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

ASSOCIATIONS

(General Support)

American Institute of Architects, Washington, D. C.
American Society of Sanitary Engineering, Minneapolis, Minn.
Lead Industries Association, New York, N. Y.
National Association of Plumbing Contractors, Washington, D. C.
Plumbing Fixture Manufacturers Association, Washington, D. C.
Plumbing and Heating Wholesalers of New England, Inc., Boston, Mass.
Prefabricated Home Manufacturers' Institute, Washington, D. C.
Western Plumbing Officials Association, Los Angeles, Calif.

FIRMS AND OTHER INTERESTS

AAA Corp., Chicago, Ill.
Abingdon Potteries, Inc., Abingdon, Ill.
Adams, Franklin O., Tampa, Fla.
Aitchison-Richmond Supply Co., St. Joseph, Mo.
Allied Supply Co., Inc., Lyons, Ill.
American Plumbers Supply Co., Toledo, Ohio
American Plumbing & Steam Supply Co., Tacoma, Wash.
American Radiator & Standard Sanitary Corp., New York, N. Y.
Atlas Brass Foundry Co., Columbus, Ohio
Auchinachie, Ralph, Plumbing & Heating, Binghamton, N. Y.
Axtell Co., Fort Worth, Tex.
Baumer, Herbert, Ohio State University, Columbus, Ohio.
Bayonne Plumbing Supply Co., Bayonne, N. J.
Beacham & Beacham, Greenville, S. C.
Bethany Hospital, Kansas City, Kans.
Birdsall, W. A., & Co., Linden, N. J.
Blodgett Supply Co., Inc., Burlington, Vt.
Bradley, J. R., Co., Inc., Reno, Nev.
Braman Dow & Co., Boston, Mass.
Briggs Manufacturing Co., Detroit, Mich.
Brooks-Borg, Des Moines, Iowa.
Brust & Brust, Milwaukee, Wis.
Camlet, J. Thomas, Passaic, N. J.
Cannon & Mullen, Salt Lake City, Utah
Careva Co., Inc., York, Pa.
Carstens Bros., Ackley, Iowa
Case, W. A., & Son Manufacturing Co., Robinson, Ill.
Chandler Co., Cedar Rapids, Iowa
Charleston Hardware Co., Charleston, W. Va.
Chesco Co., New York, N. Y.
Chicago Plumbing Testing Laboratory, Chicago, Ill. (General support.)
Chicago Pottery Co., Chicago, Ill.
Cleveland Clinic Foundation, Cleveland, Ohio
Clompus, I. M., West Chester, Pa.
Connor Co., Peoria, Ill.
Conrad & Cummings, Binghamton, N. Y.
Consolidated Supply Co., Portland, Oreg.
Cooper Supply Co., Tulsa, Okla.
Crane Co., Chicago, Ill.
Crown Sanitary Pottery, Inc., Evansville, Ind.
Cullen Co., Chicago, Ill.
Dalziel Plumbing Supplies, San Francisco, Calif.
Danser Hardware & Supply Co., Weston, W. Va.
Detroit, City of, Department of Buildings & Safety Engineering, Detroit, Mich.
Dubuque, R. A., Supply Co., St. Louis, Mo.
Du-Kane Supply Co., Pittsburgh, Pa.
Duner Co., Chicago, Ill.
Elizabeth Plumbing & Heating Supply Co., Elizabeth, N. J.
Empire Supply Co., Inc., Visalia, Calif.

Fall River Steam & Gas Pipe Co., Corp., Fall River, Mass.
Federal Huber Co., Chicago, Ill.
Fetzer & Fetzer, Salt Lake City, Utah
Flannagan, Eric G., & Sons, Henderson, N. C.
Fleck Co., Camden, N. J.
Florida Automobile & Gas Engine Co., Tampa, Fla.
Flushing Plumbing Supply Co., Inc., Flushing, N. Y.
Fords Porcelain Works, Perth Amboy, N. J.
Galloup Pipe & Supply Co., Battle Creek, Mich.
Gerber Plumbing Fixtures Corp., Chicago, Ill.
Gibbons, M. J., Supply Co., Dayton, Ohio
Glauber, Inc., New York, N. Y.
Glick Supply Co., Marshalltown, Iowa
Green, Raymond C., & Co., Jenkintown, Pa.
Hajoca Corp., Philadelphia, Pa.
Hanson & Gavin, Virginia, Minn.
Harley, Ellington & Day, Inc., Detroit, Mich.
Hefley Co., Battle Creek, Mich.
Hendrickson, Mrs. Bert W., Bradenton, Fla.
Hubbard, S. B., Co., Jacksonville, Fla.
Illinois Supply Co., Aurora, Ill.
Industrial Supply Co., Terre Haute, Ind.
Iowa Methodist Hospital, Des Moines, Iowa
"I-X-L" Pump & Manufacturing Co., Inc., Philadelphia, Pa.
James, W. T., Hardware & Plumbing Co., Bisbee, Ariz.
Jardine Plumbing Co., Chillicothe, Ohio
Johnson, J. D., Co., Pensacola, Fla.
Johnson Plumbing Supply Co., Chicago, Ill.
Keenan Pipe & Supply Co., Los Angeles, Calif.
Knapp Supply Co., Inc., Muncie, Ind.
Kohler Co., Kohler, Wis.
Kokomo Sanitary Pottery Corp., Chicago, Ill.
La Crosse Plumbing Supply Co., La Crosse, Wis.
Lansing Supply Co., Lansing, Mich.
Levine, Samuel, New York, N. Y.
Loeb, Laurence M., White Plains, N. Y.
Long Supply Co., Chicago, Ill.
Malone Plumbing Supply Co., Pittsburgh, Pa.
Mann & Co., Hutchinson, Kans.
Mansfield Sanitary Pottery, Inc., Perrysville, Ohio
May Supply Co., Anderson, Ind.
McArdle & Cooney, Inc., Philadelphia, Pa.
McNeill, O. H., Plumbing & Heating Contractor, Herrin, Ill.
Mechanical Construction Corp., Hibbing, Minn.
Methodist Hospital of Gary, Inc., Gary, Ind.
Michigan Supply Co., Lansing, Mich.
Miller, Vrydagh & Miller, Terre Haute, Ind.
Milwaukee Sanitarium Foundation, Wauwatosa, Wis.
Miner Supply Co., Red Bank, N. J.
Montgomery & Patteson, Charleston, W. Va.
Morrison Supply Co., Fort Worth, Tex.
Mott Bros. Co., Rockford, Ill.
Mott Company of Pennsylvania, Philadelphia, Pa.
Nelson, N. O., Co., St. Louis, Mo.
Newar Supply Co., Chicago, Ill.
Norris-Thermador Corp., Walnut, Calif.
Oklahoma, University of, Norman, Okla.
Patterson, W. S., Co., Appleton, Wis.
Plumbers & Factory Supplies, Inc., Columbus, Ohio
Plumbers Supply Co., New Bedford, Mass.
Plumbers Supply Co., Inc., Louisville, Ky.
Plumbers Supply Company of St. Louis, St. Louis, Mo.
Poekert, R. A., Pittsburgh, Pa.
Prier Brass Manufacturing Co., Kansas City, Mo.
Proctor Community Hospital, Peoria, Ill.
Providence Pipe & Sprinkler Co., Providence, R. I.
Raffel Supply Co., Chicago, Ill.
Resnikoff, Abraham, New York, N. Y.
Riber, George L., Detroit, Mich.

Richmond Radiator Co., Metuchen, N. J.
 Roberts-Hamilton Co., Minneapolis, Minn.
 Robischung-Kiesling Contracting Corp., Houston, Tex.
 Rodgers Supply Co., McKees Rocks, Pa.
 Royal Brass Manufacturing Co., Cleveland, Ohio
 Russell Mullgardt Schwarz Van Hoefen, St. Louis, Mo.
 Sales, Murray W., & Co., Detroit, Mich.
 Sanitary Plumbing Co., Redlands, Calif.
 Seaford Plumbing Supply Co., Seaford, Del.
 Sears, Roebuck & Co., Chicago, Ill.
 Seashore Supply Co., Atlantic City, N. J.
 Seekell, H. H., Ypsilanti, Mich.
 Sentry Sanitary Corp., Mannington, W. Va.
 Shelbina Pottery Co., Shelbina, Mo.
 Sleeper, Harold R., New York, N. Y.
 Southard Supply, Inc., Columbus, Ohio
 Southern States Supply Co., Columbia, S. C.
 Southside Plumbing & Heating Maintenance, Freeport, N. Y.
 Speakman Co., Wilmington, Del.
 Square Supply Co., Knoxville, Tenn.
 Staub, Rather & Howze, Houston, Tex.
 Stevens, Inc., Hutchinson, Kans.
 Stoetzel, Ralph E., Chicago, Ill.
 Stravs, Carl B., Minneapolis, Minn.
 Sweet's Catalog Service, New York, N. Y. (General support.)
 Tennessee Mill & Mine Supply Co., Knoxville, Tenn.
 Thorne, Henry Calder, Ithaca, N. Y.
 Trant, Thomas, & Bro., Inc., Hartford, Conn.
 Treaty Co., Greenville, Ohio
 Trimble & Lutz Supply Co., Wheeling, W. Va.
 Trumbull Plumbing Supply Co., Inc., Warren, Ohio
 United States Testing Co., Inc., Hoboken, N. J. (General support.)

Universal-Rundle Corp., New Castle, Pa.
 Van Denberg Supply Co., Rockford, Ill.
 Walker Supply Co., Trenton, N. J.
 Walsh, Louis A., Waterbury, Conn.
 Warburton's, Madera, Calif.
 Weber, C. L., & Co., Inc., Philadelphia, Pa.
 Weeks, Ralph E., Co., Scranton, Pa.
 Welch, Carroll E., Huntington, N. Y.
 Westchester Square Plumbing Supply Co., Inc., New York, N. Y.
 Western Electric Co., Inc., New York, N. Y.
 Western Pottery Co., Inc., Hollydale, Calif.
 Wierman, Diller, Inc., Hanover, Pa.
 Wigman Co., Sioux City, Iowa
 Willow Supply Corp., Bronx, New York, N. Y.
 Wisconsin River Supply Co., Wausau, Wis.
 Wolf, Louis G., Henderson, Ky.
 Wolverine Brass Works, Grand Rapids, Mich.
 Wood, Edward J., & Son, Clarksburg, W. Va.
 Woodbridge Sanitary Pottery Corp., Chicago, Ill.
 Woolcock Plumbing & Heating Co., Niagara Falls, N. Y.
 Worthen, A. B., Co., Methuen, Mass.
 Worthington, George, Co., Cleveland, Ohio
 Zimmerman, A. C., Los Angeles, Calif.

U. S. GOVERNMENT AGENCIES

Department of the Air Force, Wright-Patterson Air Force Base, Ohio
 Department of the Army, Office, Deputy Chief of Staff for Logistics, Washington, D. C.
 Federal Housing Administration, Washington, D. C.
 Panama Canal Co., Division of Storehouses, Balboa, Canal Zone
 Public Buildings Service, General Services Administration, Washington, D. C.